FIG. 18A

ORGANIZATION :

S1	<Name>
S2	<Belongs to Higher parent Organization>
S3	<Owns Suborganization (s)>
S4	<Orgn Type>
S5	<Work Type>
S6	<Work Domain>
S7	<Address which is VENUE>
S8	<has a Nominal head>
S9	<has a Representative head>
S10	<Phone Number>
S11	<Fax Number>
S12	<number of Persons working>
...	

FIG. 18B

Example of Organization :

S1	Canon R & D Headquarters
S2	(Canon Inc)
S3	(A & B Center, C & C Center, D & D Center)
S4	Private
S5	R & D
S6	(Optice)
S7	(Tokyo, Ohta-Ku, Shimomaruko 3-30-2)
S8	Senior General Manager
S9	Senior General Manager
S10	(+81-03-3871-2111)
S11	(+81-03-3971-3701)
S12	2822
...	

FIG. 19A

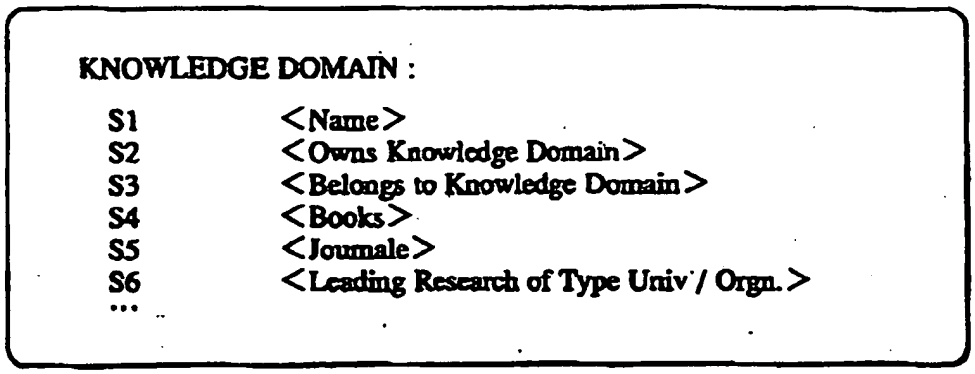


FIG. 19B

Example

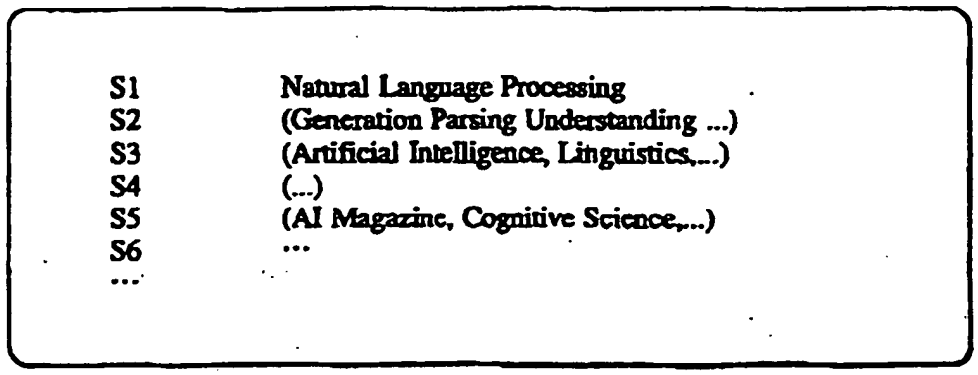


FIG. 20

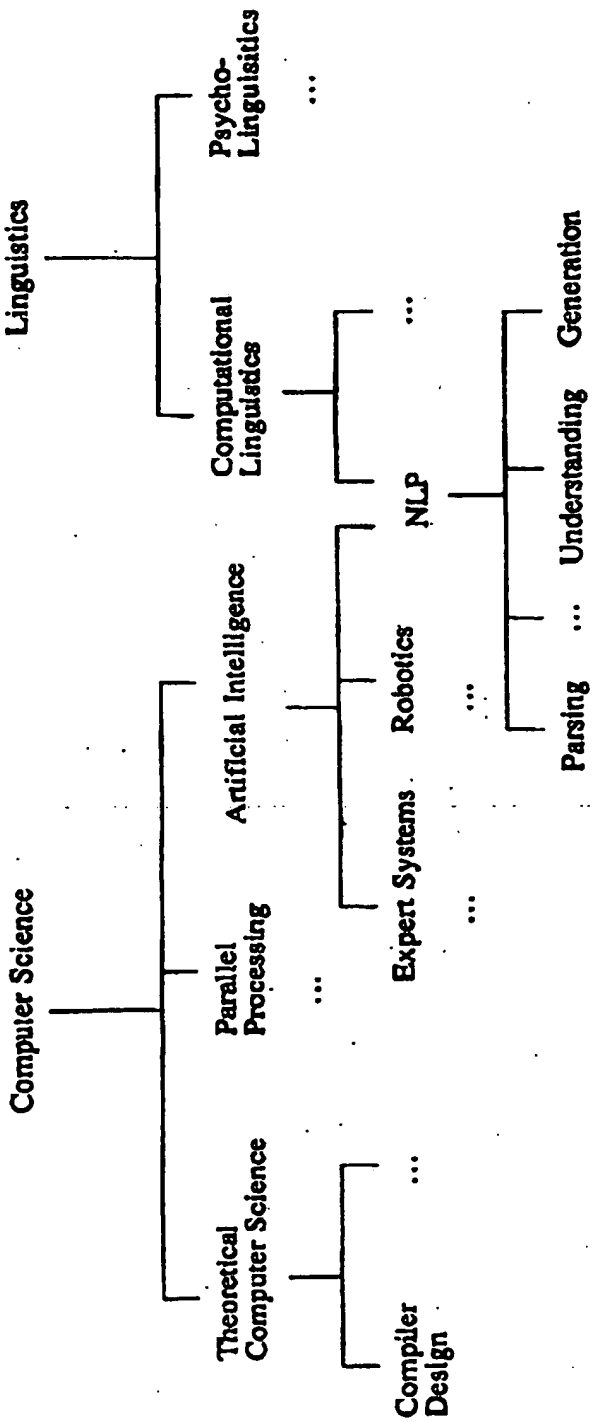

Linguistics
Psycho-Linguistics
...
Computational Linguistics
Computer Science
Artificial Intelligence
NLP
...
Parallel Processing
Robotics
...
Expert Systems
...
Theoretical Computer Science
...
Compiler Design
Parsing
...
Understanding
Generation

FIG. 21

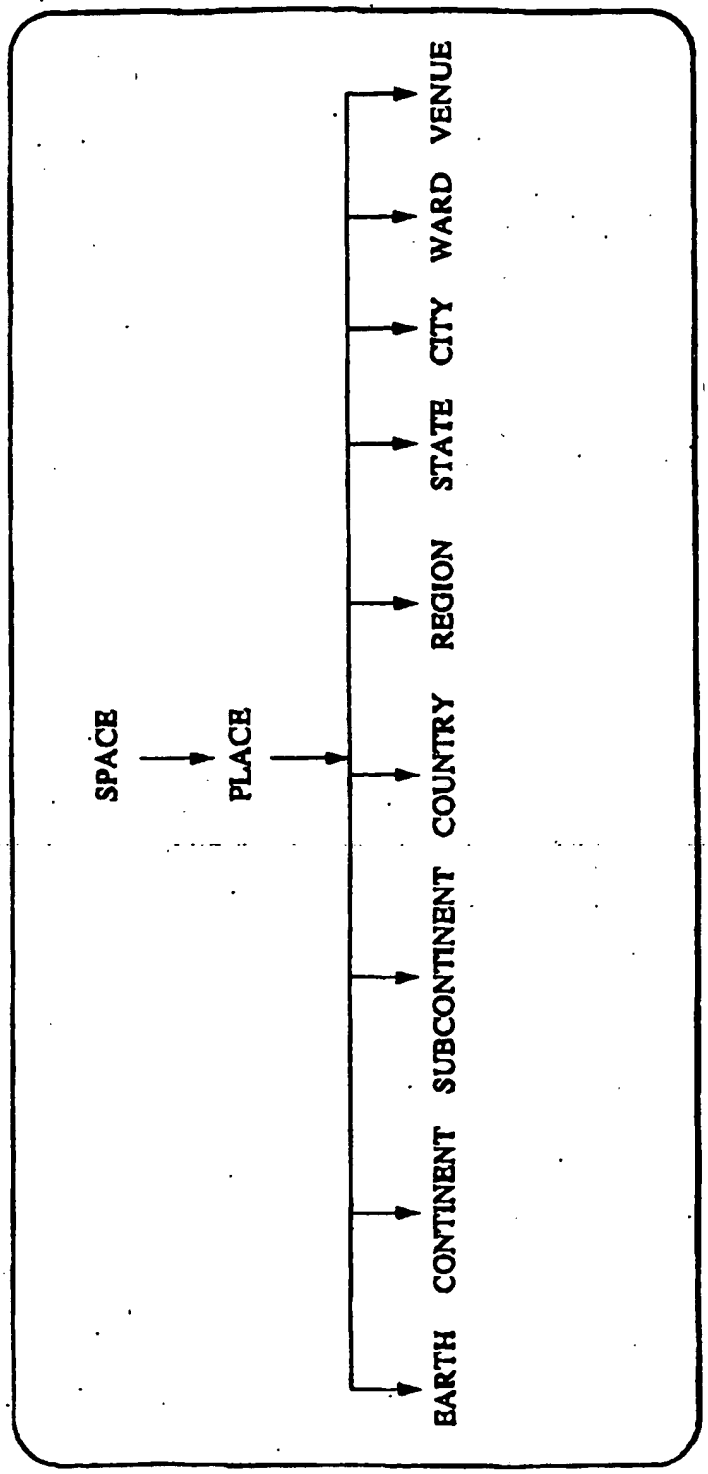

SPACE
PLACE
EARTH
CONTINENT
SUBCONTINENT
COUNTRY
REGION
STATE
CITY
WARD
VENUE

FIG. 22A

PLACE :

S1	<Name>
S2	<Owns Places>
S3	<Belongs to Places>
S4	<has Population>
S5	<has Persons>
S6	<occupies Area>
S7	<Located at>

FIG. 22B

COUNTRY :

S1	<Name>
S2	<State> 「Owns」
S3	<Continent> 「Belongs to」
S4	<hes Population>
S5	<has Persons>
S6	<occupies Area>
S7	<Located at>
S8	<Capital which is City>

FIG. 22C

Example of Country :

S1	Japan
S2	Tokyo, Osaka, Kanagawa, Hokkaido,...
S3	Asia
S4	(150 million)
S5	...
S6	...
S7	...
S8	Tokyo

FIG. 23

Venue

- name
- building name
- address
- city
- state
- region
- country
- subcontinent
- continent

FIG. 24

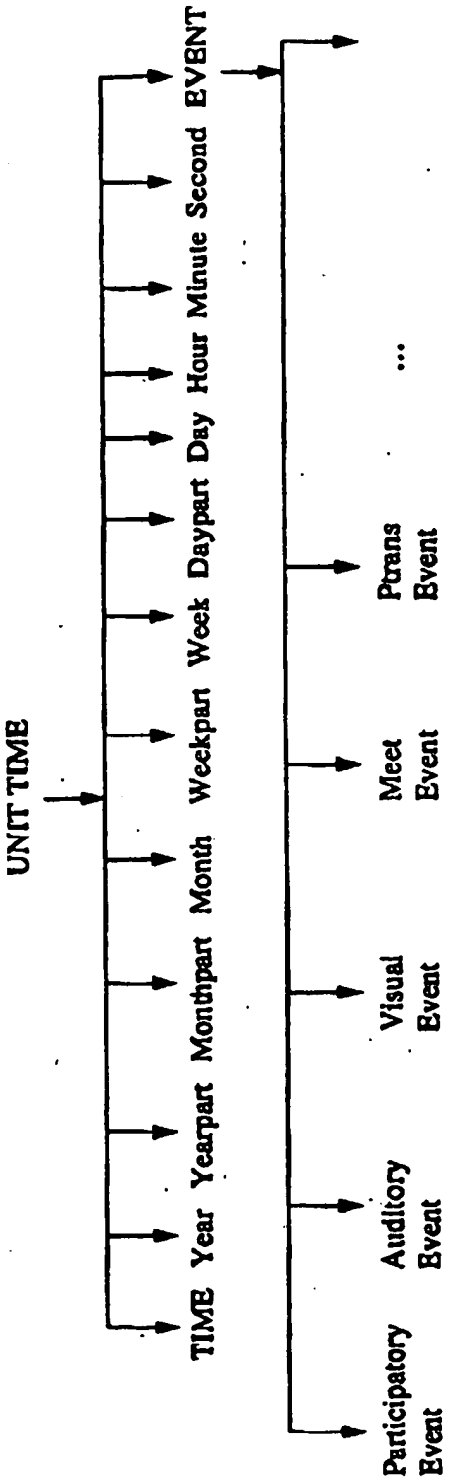

UNIT TIME
TIME
Year
Yearpart
Monthpart
Month
Weekpart
Week
Daypart
Day
Hour
Minute
Second
EVENT
...
Participatory Event
Auditory Event
Visual Event
Meet Event
Ptrans Event

FIG. 25

UNIT TIME :

S1	<Owns Unit Time>
S2	<Belongs to Unit Time>
S3	<Count>
S4	<Qualifier>

TIME :

S1	<has Second>
S2	<has Minute>
S3	<has Hour>
S4	<has Day>
S5	<has Day part>
S6	<has Week>
S7	<has Week part>
S8	<has Month>
S9	<has Month part>
S10	<has Year>
S11	<has Year part>
S12	<has related event>

FIG. 26

a1) Events :

- Name
- Starting time
- Ending time
- Venue
- Description
- Ser of Associated Events

a2) Subcategories of Events

Natural Events (e.g. floods, monsoons etc.)

Intentional (organized by animate objects

e.g. party, conference, meeting etc.)

b) Intentional

* Participatory Event (e.g., Training Program)
* Auditory Event (e.g., Conference)
* Visual Event (e.g., Domonstration, Exhibition, Show)
* Meet Event (e.g., Reception, Meeting)
* Ptrans Event (e.g., Flight)

EP 0 720 090 A2

FIG. 27A

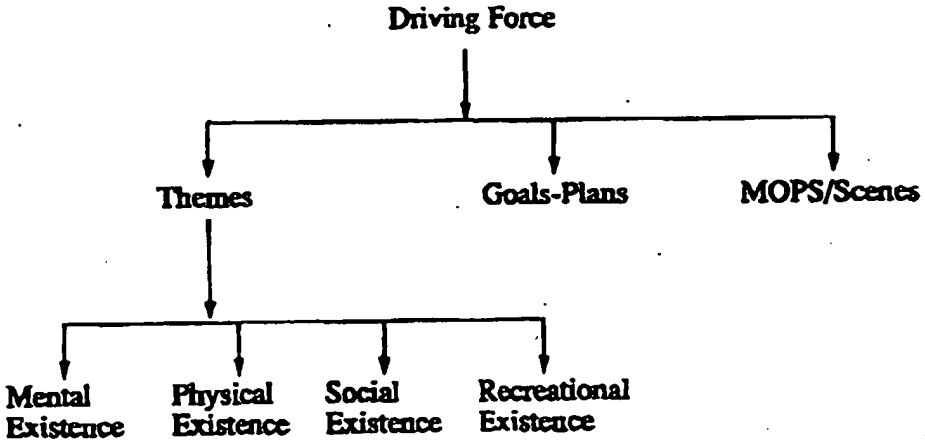


FIG. 27B

Themes

Mental Existence (e.g., Work for Existence, Get Reward)

Physical Existence

- Get _ Resource (like Money, Food) - Work

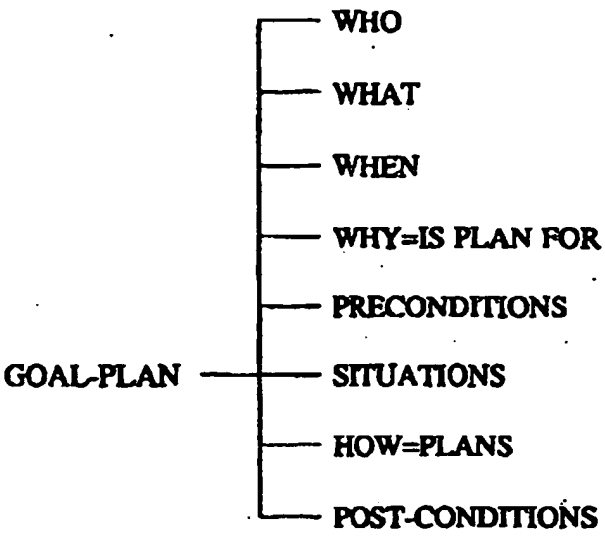
Social Existence

- preserve relationship
- preserve professional status

Recreational

- sight seeing

FIG. 28



Example :

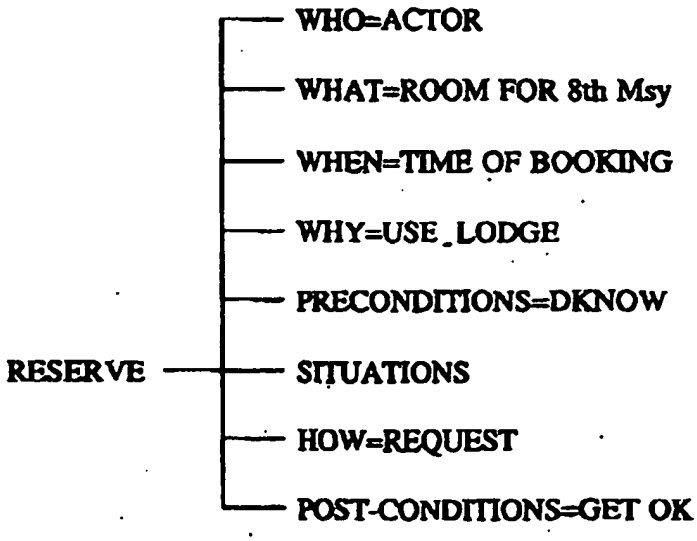
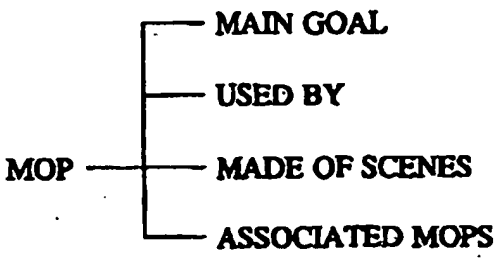


FIG. 29



Example :

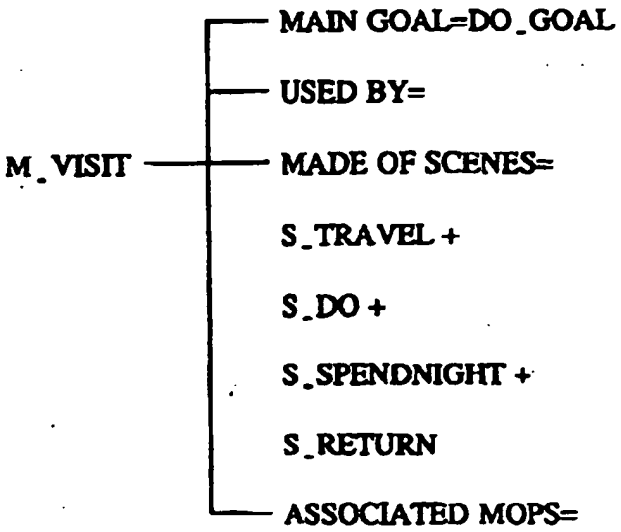
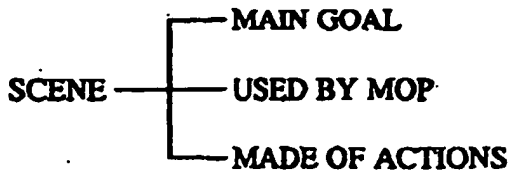


FIG. 30



Example :

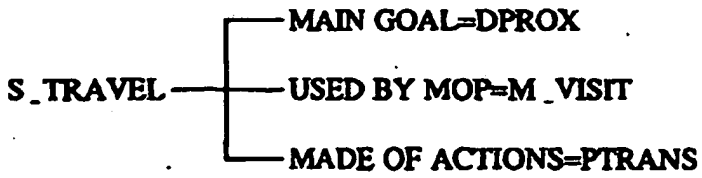


FIG. 31

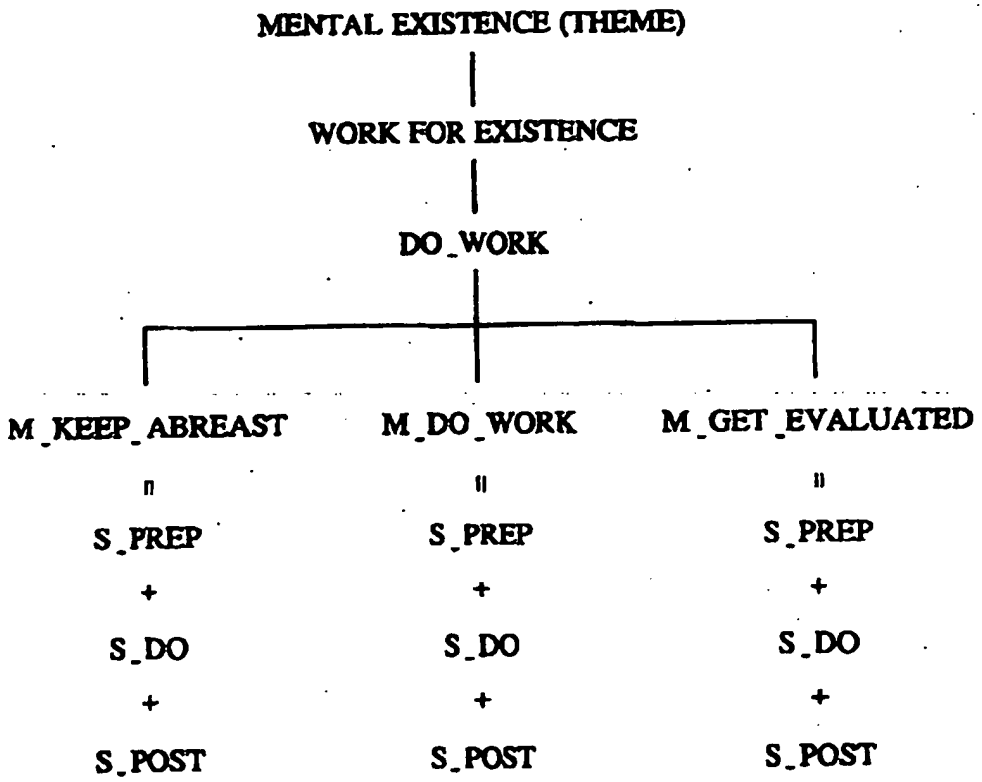

MENTAL EXISTENCE (THEME)
WORK FOR EXISTENCE
DO_WORK
M_KEEP_ABREAST
=
S_PREP
+
S_DO
+
S_POST
M_DO_WORK
=
S_PREP
+
S_DO
+
S_POST
M_GET_EVALUATED
=
S_PREP
+
S_DO
+
S_POST

FIG. 32

E.g., Domain	R&D	Sales
M_KEEP_ABREAST		
S_PREP	decide area	decide broad area
S_DO	read/discuss	market survey/discuss
S_POST	summarize	report
M_DO_WORK		
S_PREP	choose theory	choose product
S_DO	modify/experiment	sell
S_POST	integrate results	make profit
M_GET_EVALUATED		
S_PREP	choose technique	choose feedback method
S_DO	present/publish	consumer feedback
S_POST	integrate feedback	improve product

FIG. 33

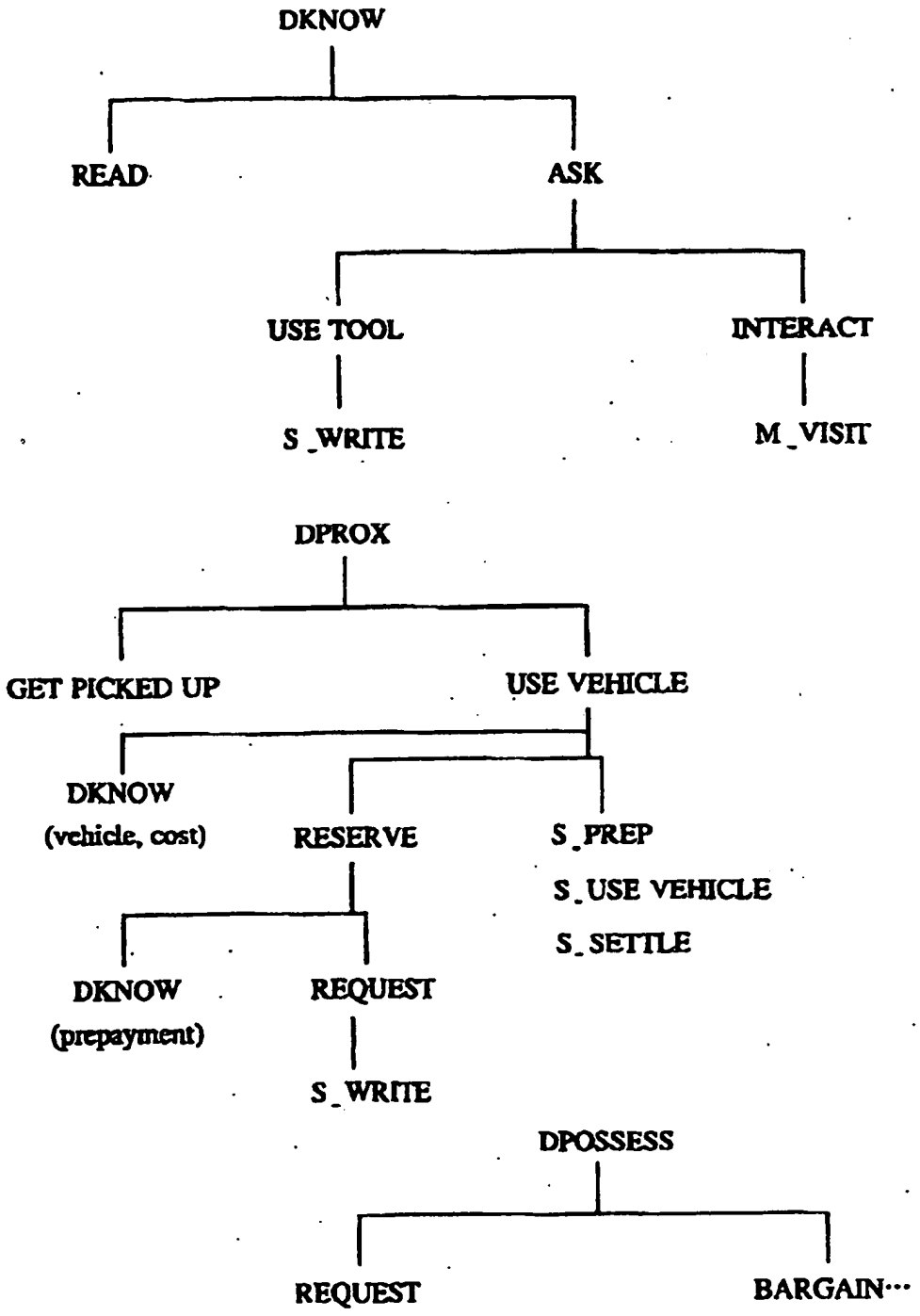

DKNOW
READ
ASK
USE TOOL
INTERACT
S_WRITE
M_VISIT
DPROX
GET PICKED UP
USE VEHICLE
DKNOW
(vehicle, cost)
RESERVE
S_PREP
S_USE VEHICLE
S_SETTLE
DKNOW
(prepayment)
REQUEST
S_WRITE
DPOSSESS
REQUEST
BARGAIN···

FIG. 34

ACTION / Results of Driving Forces

SLOTNAME	
Actor	<Person / Animate who is the agent>
Object	<which is the object of Action>
Instrument	<which is instrumental to Action / including procedures>
Iobject - Beneficiary	<Person who benefits>
- Reason	<which is an Action>
- Direction	<which can be Place or Person>
- Via	<which can be Place or Person>
From	<which can be Place or Person>
Support	<which can be Place or Organization>
Time	<which is Time>
Connected To	
Tense / Modal	o o o
Qualifier	
o o o	

EP 0 720 090 A2

FIG. 35

AGREEMENT	(e.g. accept, decline, book, reserve, hire, find time,fix appointment)
ARRANGE	(e.g., arrange, hold)
ATRANS	(e.g. borrow, buy, lend, give)
CONNECT-ACTION	(e.g., apply, based, involve, use, imply, prove, accompany)
DRIVE	(e.g. drive, fly, grasp, push)
FALL	(e.g., blow, fall, move, rain)
GROW	(e.g., age, crack, dry, grow, wither)
HAPPEN	(e.g., happen, occur)
KNEADING	(e.g., kneading, crush)
MACT	(mental actions e.g. display, show, exhibit, demonstrate, teach, lecture, publish)
MBUILD	(mental buildups e.g. decide, desing, figure out, note, plan, remember)
MEET	(e.g., meet, visit, see, receive, pick up, drop)
MFEEL	(feelings e.g. thank, accept, appreciate, reward, trouble, apologize, praise, feel)
MPROC	(mental processes e.g. think, learn, understand, remind, remember, image, wonder visualize)
MSENSE	(senses e.g. see, learn, listen, hear, attend, read, enjoy, attend, perceive)
MTRANS	(mental transfers e.g. inform, express, extend, advise, communicate, get/give, have, convey, discuss, suggest, tell, send/receive, interact, phone, write, say, call, learn, question, query, answer, instruct, contact, verify, modify, beg, urge, congratulate, acknowledge)
PACT	(physical actions e.g. write, perform, check in, dance, sing)
PERMIT-ACTION	(e.g., allow, enable, let, try)
PROBABLE-ACTION	(e.g., appear, look, seem, suggest, indicate)
PTRANS	(physical transfers e.g. go, bring, come, forward, mail, return, send/ receive, arrive, reach, return, leave, depart, deliver, dispatch, route, tour)
SUBMIT	(e.g., submit)
TPASSAGE	(e.g. wait)
USE RESOURCE	(e.g., stay, waste, spend)
WORK	(e.g., design, develop, research, study, work)

FIG. 36

MEET

SLOTNAME	
Actor	<Person / Animate who is the agent>
Object	<Person who is the object >
Instrument	
Iobject - Beneficiary	<Person who benefits>
- Reason	<which is an Action>
- Direction	nil
- Via	nil
From	
Support	<which can be Place or Organization>
Time	<which is Time>
Connected To	o o o
Tense / Modal	
Qualifier	
o o o	

EP 0 720 090 A2

FIG. 37

MEET

SLOTNAME	
Actor	PERSON
Object	PERSON
Instrument	
Iobject - Beneficiary	PERSON
- Reason	ACTION
- Direction	nil
- Via	nil
From	
Support	PLACE / ORGANIZATION
Time	TIME
Connected To	
Tense / Modal	
Qualifier	
o o o	

EP 0 720 090 A2

FIG. 38

AGREEMENT

SLOTNAME	
Actor	<Person / Animate who is the agent>
Object	<which can be Accommodation / Ticket···>
Instrument	<which is instrumental to Action / Communication>
Iobject - Beneficiary	<Person who benefits>
- Reason	<which is an Action>
- Direction	
- Via	<which can be Person>
From	
Support	
Time	<which is Time>
Connected To	o o o
Tense / Modal	
Qualifier	
o o o	

EP 0 720 090 A2

FIG. 39

MTRANS

SLOTNAME	
Actor	<Person / Animate who is the agent>
Object	<which can be Action or Object>
Instrument	<which is instrumental to Action / including procedures>
Iobject - Beneficiary	<Person who benefits>
- Reason	<which is an Action>
- Direction	<which can be Place or Person>
- Via	<which can be Place or Person>
From	<which can be Place or Person>
Support	<which can be Place or Organization>
Time	<which is Time>
Connected To	
Tense / Modal	o o o
Qualifier	
o o o	

EP 0 720 090 A2

FIG. 40

PTRANS

SLOTNAME	
Actor	<Person / Animate who is the agent>
Object	
Instrument	<which is instrumental to Action / including procedures>
Iobject - Beneficiary	<Person who benefits>
- Reason	<which is an Action>
- Direction	<which can be Place or Person>
- Via	<which can be Place or Person>
From	<which can be Place or Person>
Support	<which can be Place or Organization>
Time	<which is Time>
Connected To	
Tense / Modal	o o o
Qualifier	
o o o	

EP 0 720 090 A2

FIG. 41

PTRANS

SLOTNAME	
Actor	PERSON
Object	
Instrument	ACTION / VEHICLE
Iobject - Beneficiary	PERSON
- Reason	ACTION
- Direction	PERSON / PLACE
- Via	PERSON / PLACE
From	PERSON / PLACE
Support	PLACE / ORGANIZATION
Time	TIME
Connected To	
Tense / Modal	
Qualifier	
o o o	

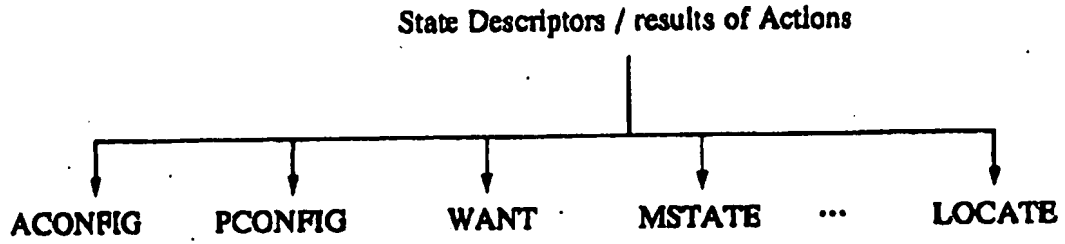
PTRANS

SLOTNAME	
Actor	PERSON
Object	
Instrument	ACTION / VEHICLE
Iobject - Beneficiary	PERSON
- Reason	ACTION
- Direction	Vicinity of Listener's Location
- Via	PERSON / PLACE
From	PERSON / PLACE
Support	PLACE / ORGANIZATION
Time	TIME
Connected To	
Tense / Modal	
Qualifier	
o o o	

FIG. 42

FORCE	DRIVEN OBJ	CHANGE	ACTION
Natural	Phy. obj.	Spetial	FALL (e.g., fall, move, rain, blow)
Natural	Phy. obj.	Temporal	GROW (e.g., dry, grow, age, wither, crack)
Natural	Human	State of Human	HAPPEN (e.g. happen, occur)
Natural	Nil	State of time	TPASSAGE (pass time)
Int. pay.	Phy. obj.	State of Resource (money, energy)	TPASSAGE (spend)
Int. mech.	Phy. obj.	Spatial	DRIVE (push, drive, fly, graep)
Int. mech.	Phy. obj.	Temporal	KNEADING
Int. pay.	Animate	Spatial	PTRANS (go, come)
Int. pay.	Animate	State of Obj/ Associated abs. entity	MSENSE
Int. pay.	Human	State of Associated abs. entity	MPROC, MBUILD MACT, MFEEL,
Int. pay.	Human, Phy. obj.	State of Phy. obj.	PACT (perform)
Int. pay.	Human-1, Human-2.	State of human-2.	MTRNS, AGREEMENT

FIG. 43



ACONFIG	(e.g., Entitle, like, own, perfer, to be, have, propose, involve)
ESCHEDULE	(e.g., arrange, organize, plan, schedule, take place, postpone)
LOCATE	(e.g., find, locate, search, look for, dislocate)
MSTATE	(e.g., agree, anticipate, believe, forsee, know, learn, please, trust, to be, understand, intereset, remember, specify)
PCONFIG	(e.g., enclose, tobe, attach, accommodate, include)
WANT	(e.g., anticipate, expect, hope, like, want, wish, need require, prefer)

EP 0 720 090 A2

FIG. 44

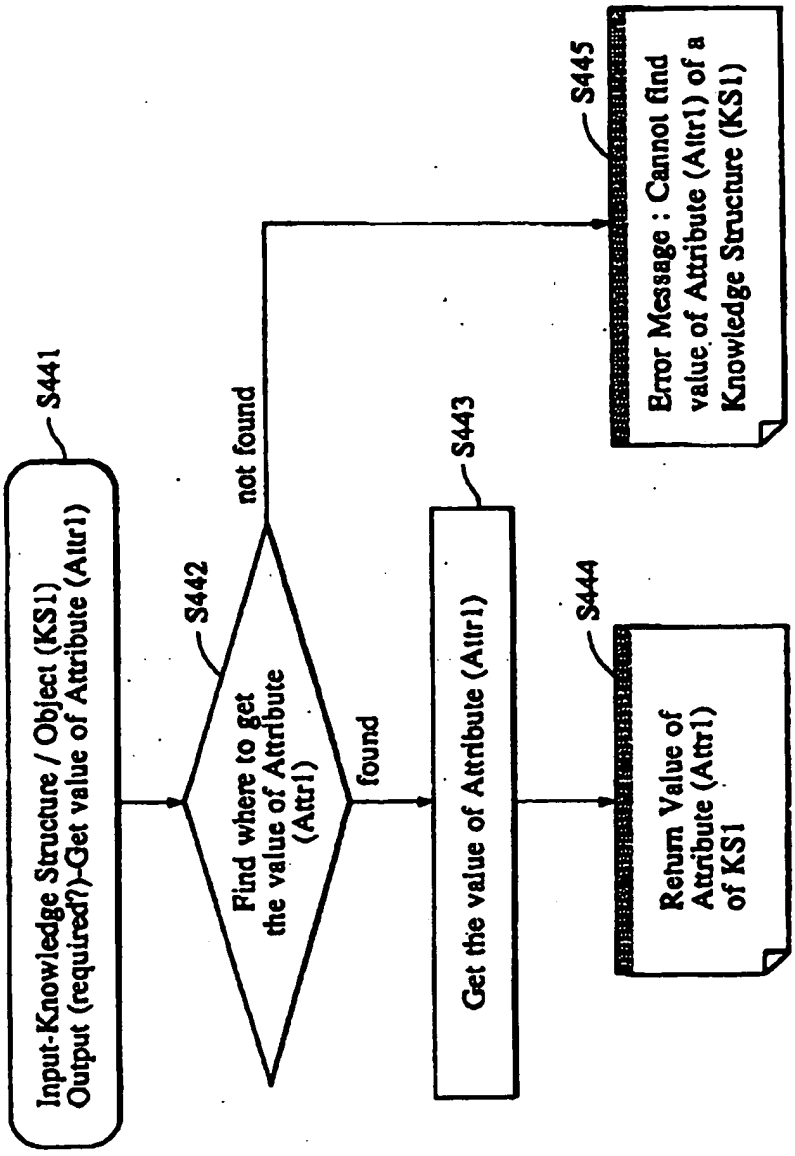

S441
Input-Knowledge Structure / Object (KS1)
Output (required?)-Get value of Attribute (Attr1)
S442
Find where to get the value of Attribute (Attr1)
not found
found
S443
Get the value of Attribute (Attr1)
S444
Return Value of Attribute (Attr1) of KS1
S445
Error Message : Cannot find value of Attribute (Attr1) of a Knowledge Structure (KS1)

FIG. 45

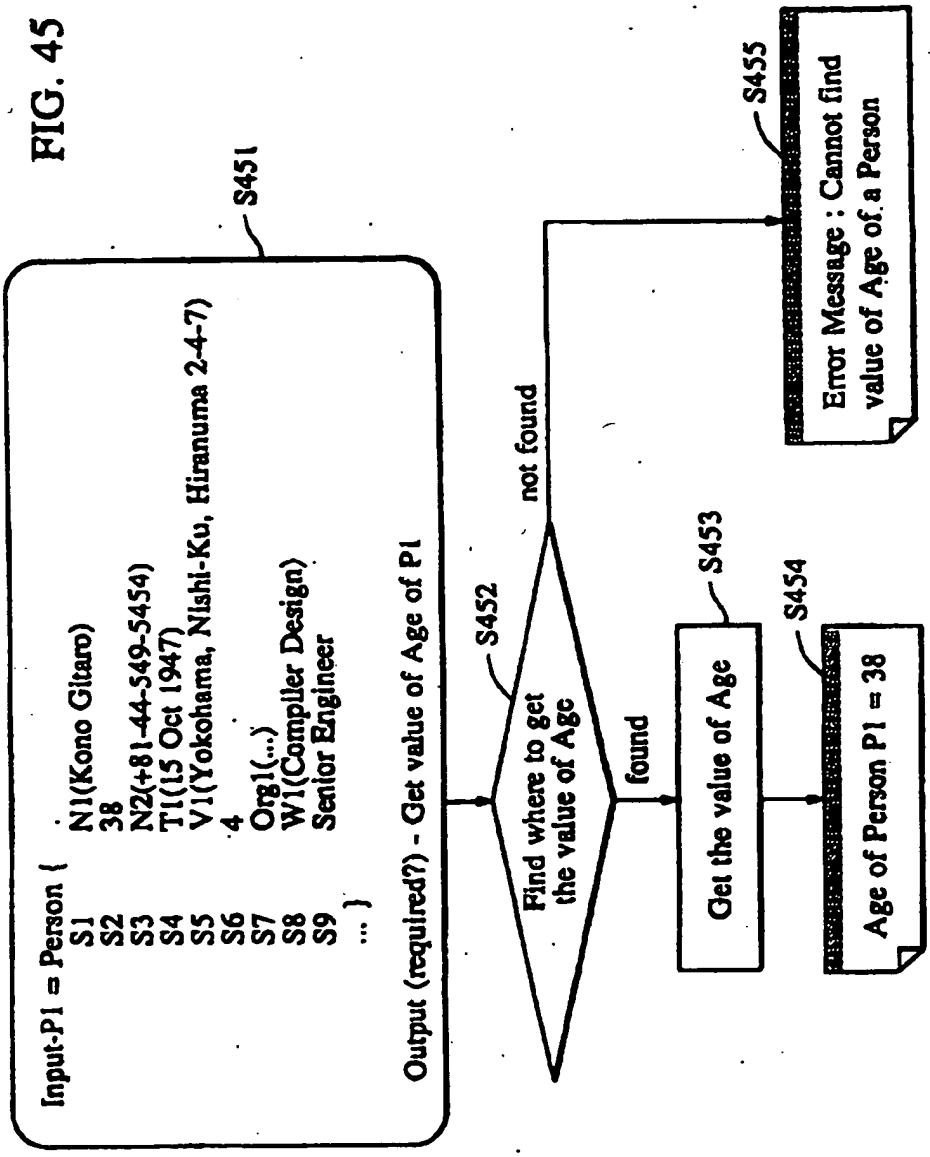

Input-P1 = Person {
S1 N1(Kono Gitaro)
S2 38
S3 N2(+81-44-549-5454)
S4 T1(15 Oct 1947)
S5 V1(Yokohama, Nishi-Ku, Hiranuma 2-4-7)
S6 4
S7 Org1(...)
S8 W1(Compiler Design)
S9 Senior Engineer
... }
Output (required?) - Get value of Age of P1
S451
Find where to get the value of Age
S452
not found
found
Get the value of Age
S453
Age of Person P1 = 38
S454
Error Message : Cannot find value of Age of a Person
S455

FIG. 46

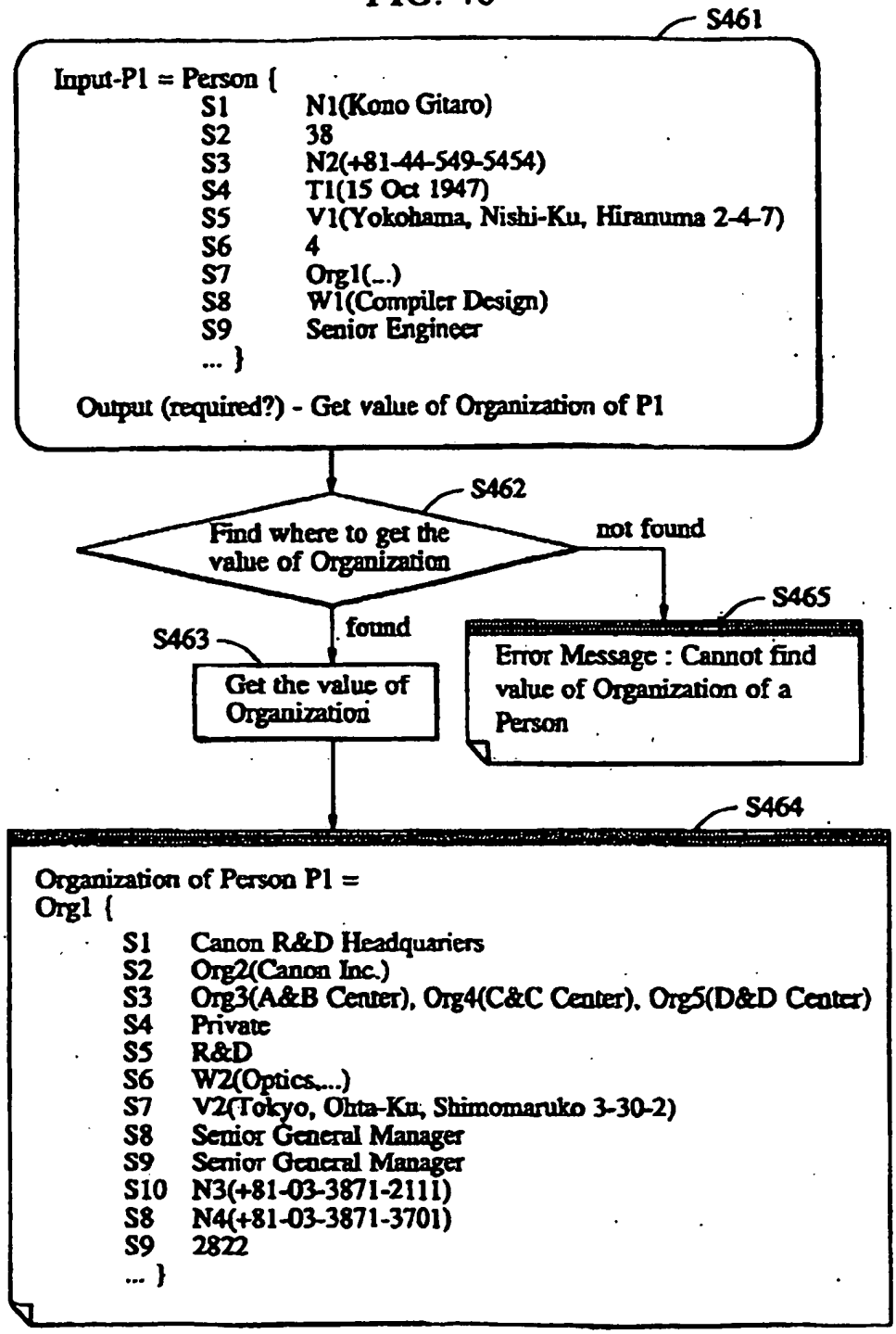

S461
Input-P1 = Person {
S1 N1(Kono Gitaro)
S2 38
S3 N2(+81-44-549-5454)
S4 T1(15 Oct 1947)
S5 V1(Yokohama, Nishi-Ku, Hiranuma 2-4-7)
S6 4
S7 Org1(...)
S8 W1(Compiler Design)
S9 Senior Engineer
... }
Output (required?) - Get value of Organization of P1
S462
Find where to get the value of Organization
not found
found
S463
Get the value of Organization
S465
Error Message : Cannot find value of Organization of a Person
S464
Organization of Person P1 =
Org1 {
S1 Canon R&D Headquariers
S2 Org2(Canon Inc.)
S3 Org3(A&B Center), Org4(C&C Center), Org5(D&D Center)
S4 Private
S5 R&D
S6 W2(Optics,...)
S7 V2(Tokyo, Ohta-Ku, Shimomaruko 3-30-2)
S8 Senior General Manager
S9 Senior General Manager
S10 N3(+81-03-3871-2111)
S8 N4(+81-03-3871-3701)
S9 2822
... }

FIG. 47

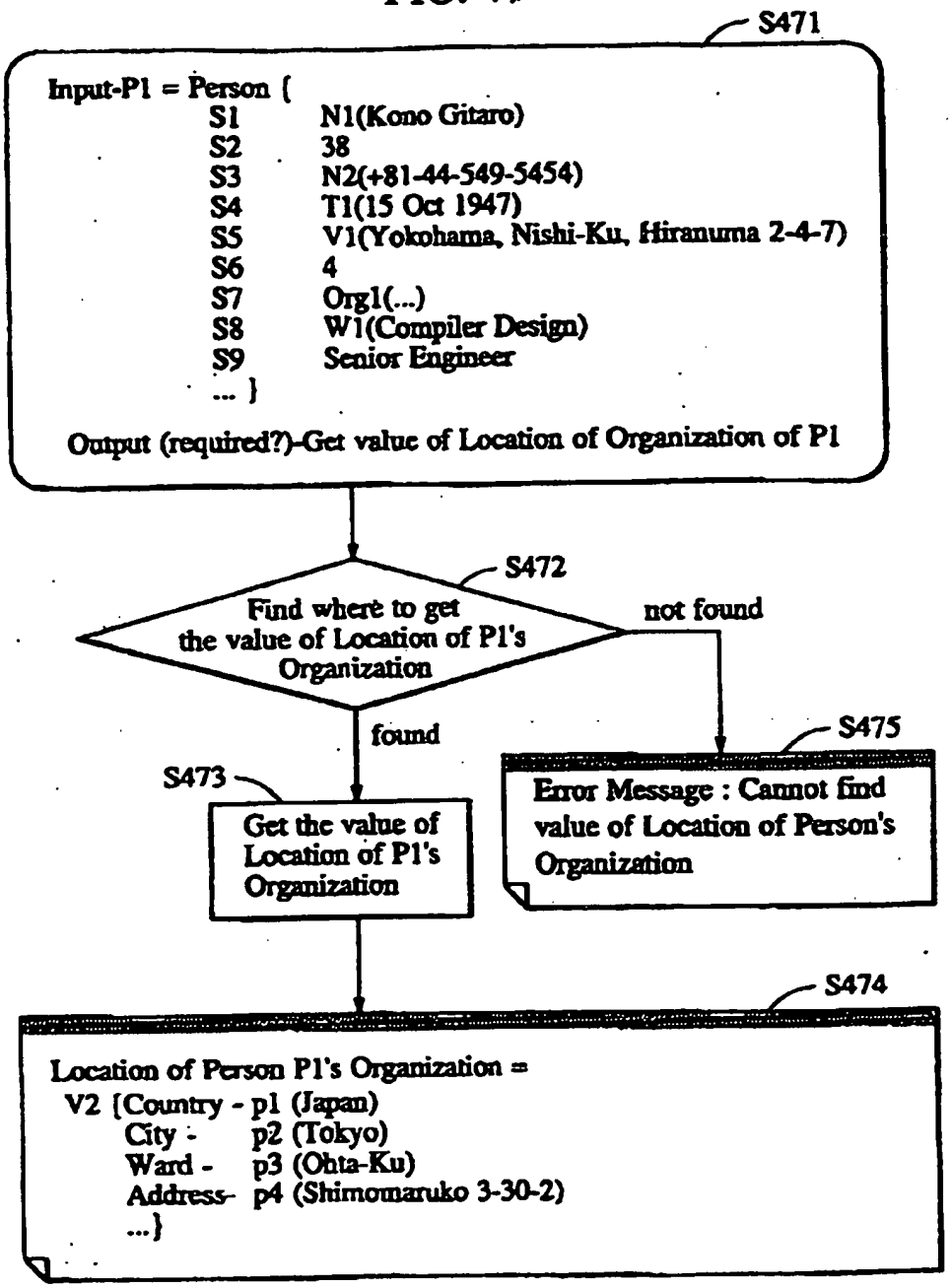

S471
Input-P1 = Person {
S1 N1(Kono Gitaro)
S2 38
S3 N2(+81-44-549-5454)
S4 T1(15 Oct 1947)
S5 V1(Yokohama, Nishi-Ku, Hiranuma 2-4-7)
S6 4
S7 Org1(...)
S8 W1(Compiler Design)
S9 Senior Engineer
... }
Output (required?)-Get value of Location of Organization of P1
S472
Find where to get the value of Location of P1's Organization
not found
found
S473
Get the value of Location of P1's Organization
S475
Error Message : Cannot find value of Location of Person's Organization
S474
Location of Person P1's Organization =
V2 {Country - p1 (Japan)
City - p2 (Tokyo)
Ward - p3 (Ohta-Ku)
Address- p4 (Shimomaruko 3-30-2)
...}

FIG. 48

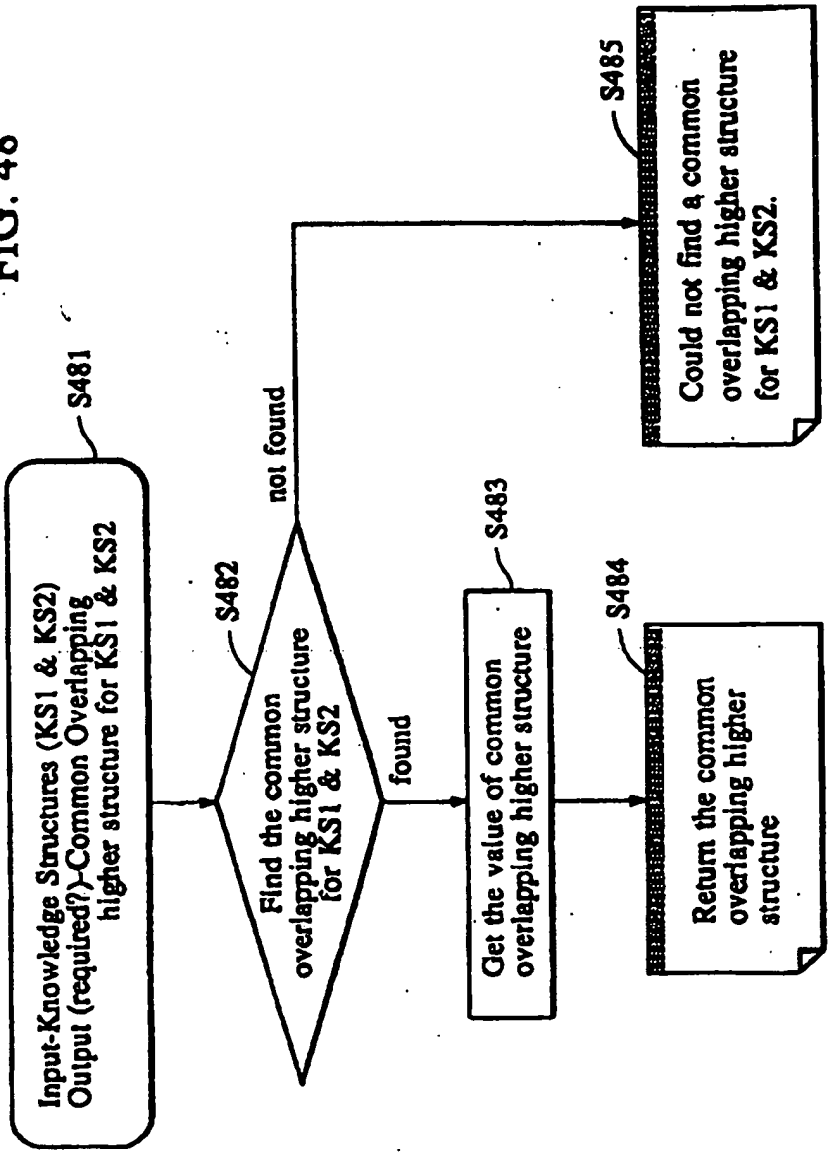

S481
Input-Knowledge Structures (KS1 & KS2)
Output (required?)-Common Overlapping higher structure for KS1 & KS2
S482
Find the common overlapping higher structure for KS1 & KS2
not found
found
S485
Could not find a common overlapping higher structure for KS1 & KS2.
S483
Get the value of common overlapping higher structure
S484
Return the common overlapping higher structure

FIG. 49

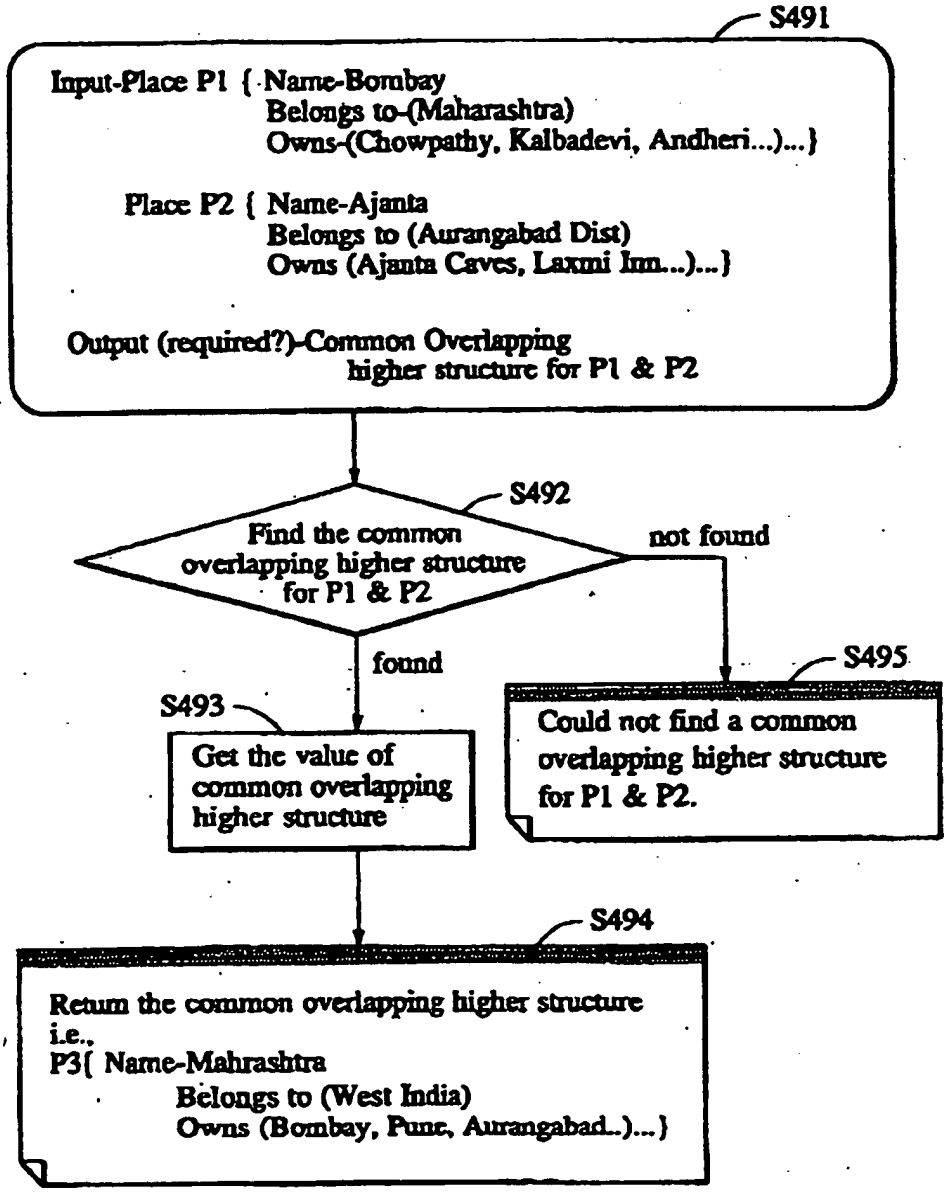

S491
Input-Place P1 { Name-Bombay
Belongs to-(Maharashtra)
Owns-(Chowpathy, Kalbadevi, Andheri...)...}
Place P2 { Name-Ajanta
Belongs to (Aurangabad Dist)
Owns (Ajanta Caves, Laxmi Inn...)...}
Output (required?)-Common Overlapping
higher structure for P1 & P2
S492
Find the common overlapping higher structure for P1 & P2
not found
found
S493
Get the value of common overlapping higher structure
S495
Could not find a common overlapping higher structure for P1 & P2.
S494
Return the common overlapping higher structure
i.e.,
P3{ Name-Mahrashtra
Belongs to (West India)
Owns (Bombay, Pune, Aurangabad..)...}

FIG. 50A

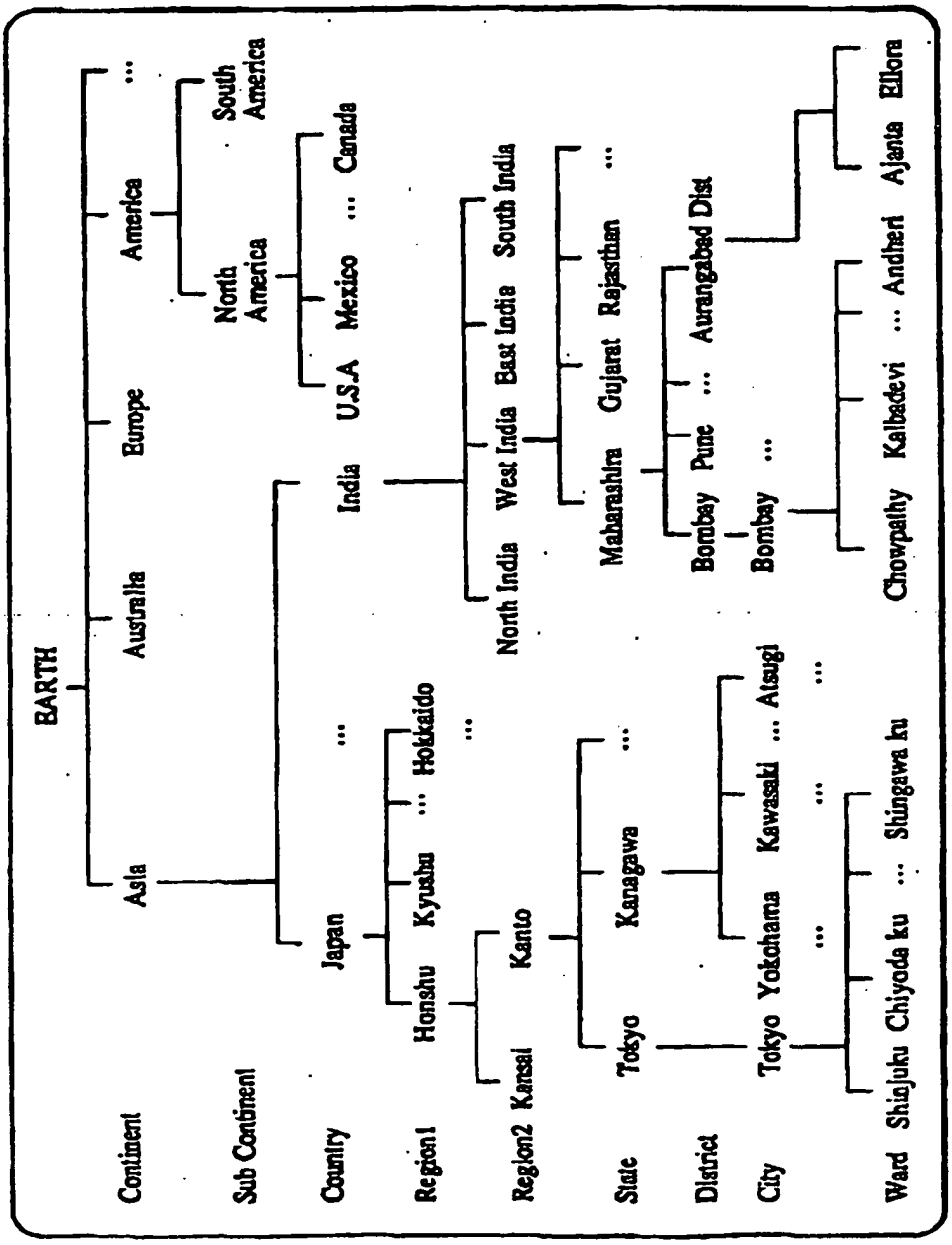

BARTH
Asia
Australia
Europe
America
...
South America
North America
Canada
Mexico
U.S.A
India
Japan
...
Hokkaido
...
Kyushu
Honshu
North India
West India
East India
South India
Kansai
Kanto
Maharashtra
Gujarat
Rajasthan
...
Tokyo
Kanagawa
...
Bombay
Pune
...
Aurangabad Dist
Tokyo
Yokohama
Kawasaki
...
Atsugi
Bombay
...
...
...
...
Chowpathy
Kalbadevi
...
Andheri
Ajanta
Ellora
Continent
Sub Continent
Country
Region1
Region2
State
District
City
Ward
Shinjuku
Chiyoda ku
...
Shingawa ku

FIG. 50B

(a) Q : Is Ajanta near Bombay ?

A : Yes, they are in the same state - Maharashtra. It takes about 45min by fight...

(b) Q : Is Ajanta in West India ?

A : Yes, it is in state - Maharashtra. It 45 minutes flight from Bombay...

(c) Q : Is Shinjuku in Japan ?

A : Yes

(d) Q : Where is Shinjuku ?

A : It is a Ward in Tokyo Metropolitan, in Japan.

(e) Q : Is Shinjuku a Ciry in Japan ?

A : No, It is a Ward in Tokyo.

EP 0 720 090 A2

FIG. 51

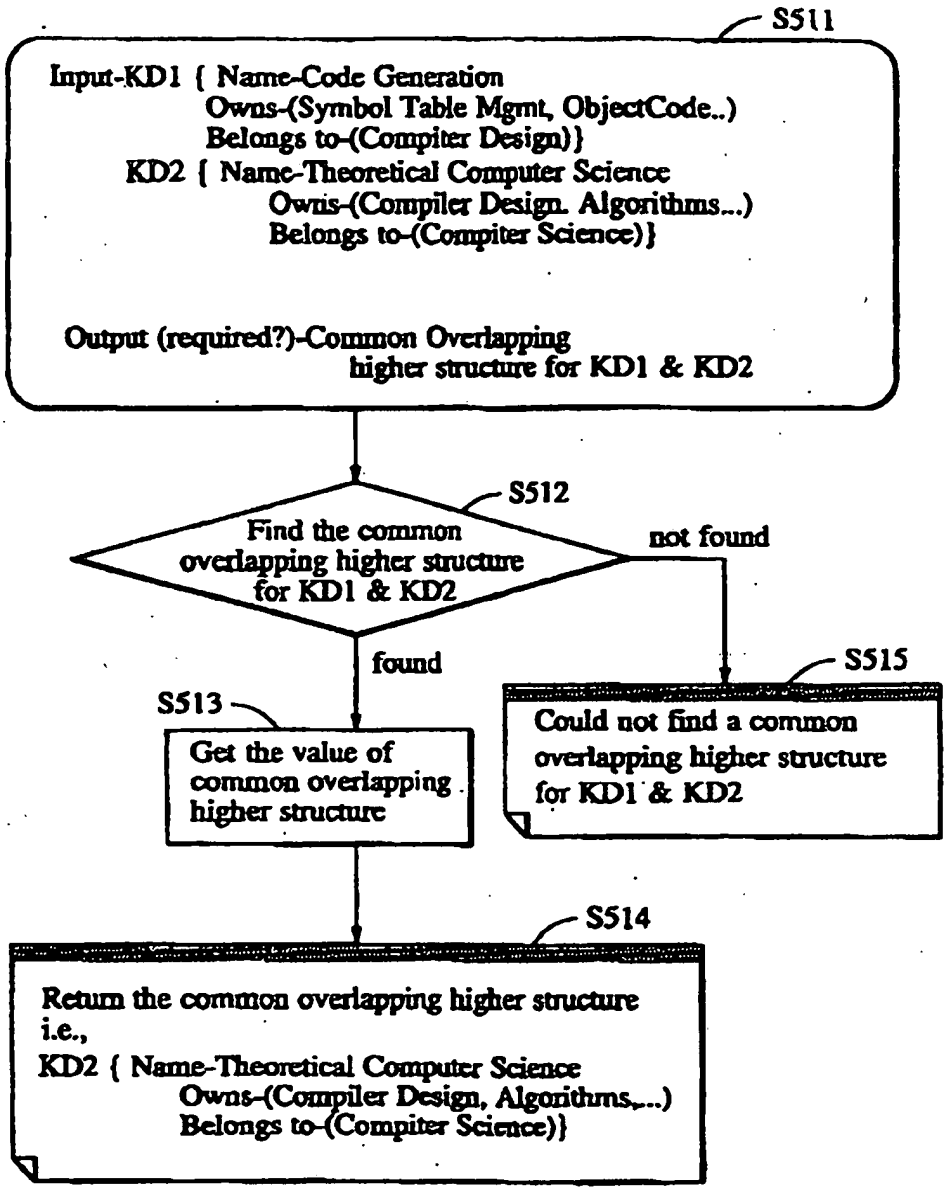
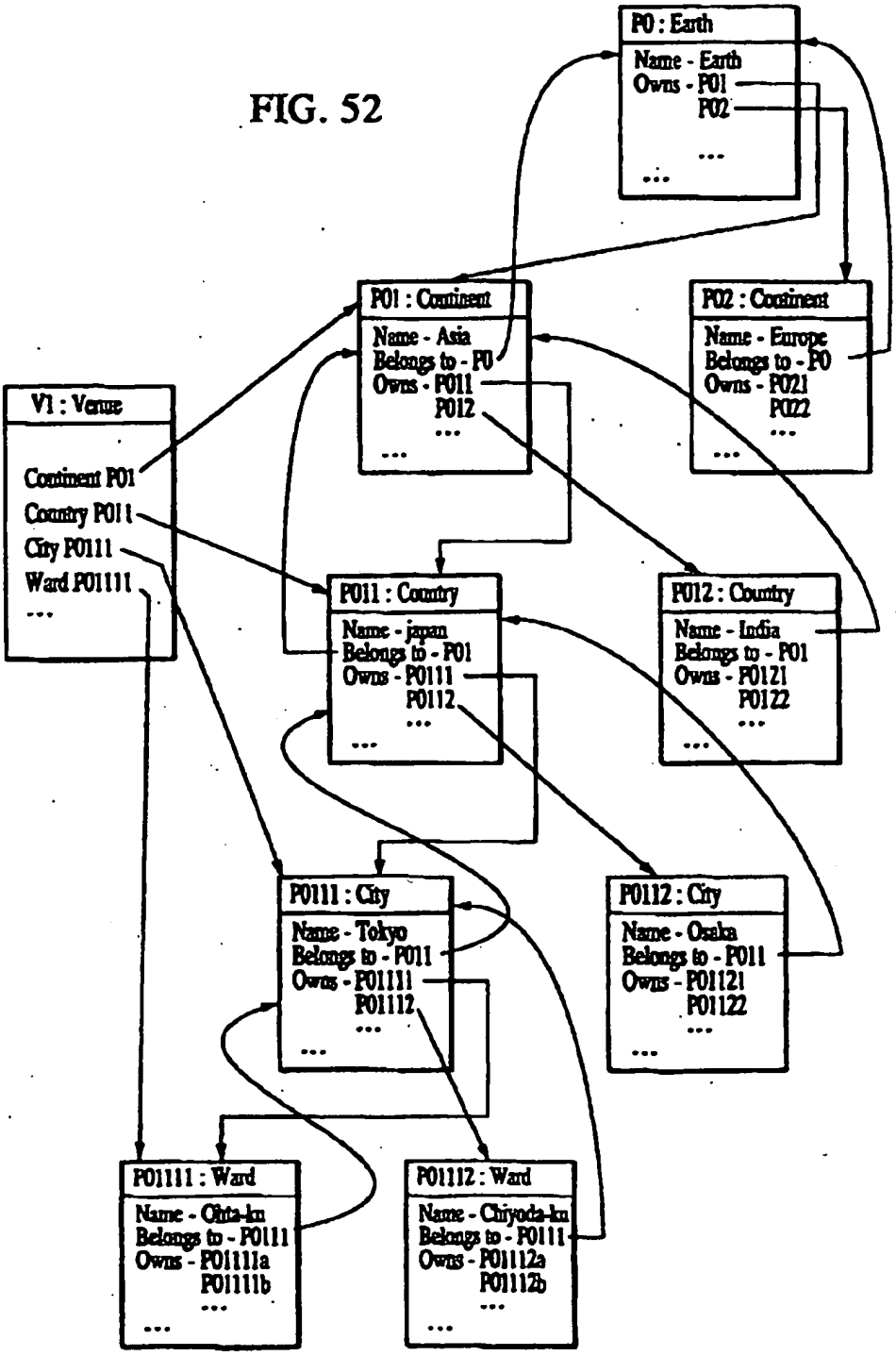

S511
Input-KD1 { Name-Code Generation
Owns-(Symbol Table Mgmt, ObjectCode..)
Belongs to-(Compiter Design)}
KD2 { Name-Theoretical Computer Science
Owns-(Compiler Design. Algorithms...)
Belongs to-(Compiter Science)}
Output (required?)-Common Overlapping
higher structure for KD1 & KD2
S512
Find the common overlapping higher structure for KD1 & KD2
not found
found
S513
Get the value of common overlapping higher structure
S515
Could not find a common overlapping higher structure for KD1 & KD2
S514
Return the common overlapping higher structure
i.e.,
KD2 { Name-Theoretical Computer Science
Owns-(Compiler Design, Algorithms,...)
Belongs to-(Compiter Science)}

FIG. 52


P0 : Earth
Name - Earth
Owns - P01
P02
P01 : Continent
Name - Asia
Belongs to - P0
Owns - P011
P012
P02 : Continent
Name - Europe
Belongs to - P0
Owns - P021
P022
V1 : Venue
Continent P01
Country P011
City P0111
Ward P01111
P011 : Country
Name - japan
Belongs to - P01
Owns - P0111
P0112
P012 : Country
Name - India
Belongs to - P01
Owns - P0121
P0122
P0111 : City
Name - Tokyo
Belongs to - P011
Owns - P01111
P01112
P0112 : City
Name - Osaka
Belongs to - P011
Owns - P01121
P01122
P01111 : Ward
Name - Ohta-ku
Belongs to - P0111
Owns - P01111a
P01111b
P01112 : Ward
Name - Chiyoda-ku
Belongs to - P0111
Owns - P01112a
P01112b

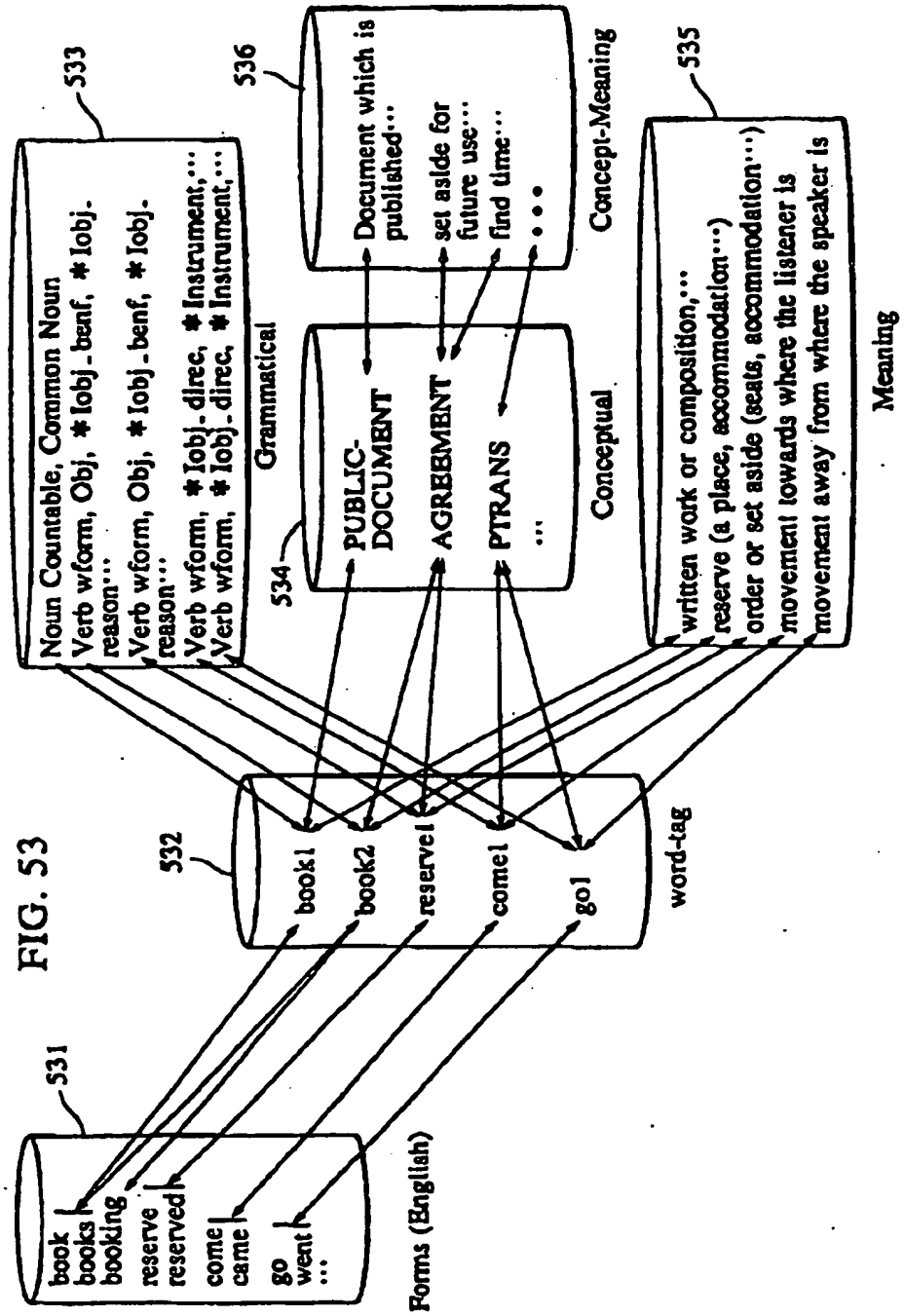

533
Noun Countable, Common Noun
Verb wform, Obj, *Iobj_benf, *Iobj-reason···
Verb wform, Obj, *Iobj_benf, *Iobj-reason···
Verb wform, *Iobj_direc, *Instrument,···
Verb wform, *Iobj_direc, *Instrument,···
Grammatical
536
Document which is published···
set aside for future use···
find time···
• • •
Concept-Meaning
534
PUBLIC-DOCUMENT
AGREEMENT
PTRANS
···
Conceptual
535
written work or composition,···
reserve (a place, accommodation···)
order or set aside (seats, accommodation···)
movement towards where the listener is
movement away from where the speaker is
Meaning
532
book1
book2
reserve1
come1
go1
word-tag
531
book
books
booking
reserve
reserved
come
came
go
went
···
Forms (English)

FIG. 53

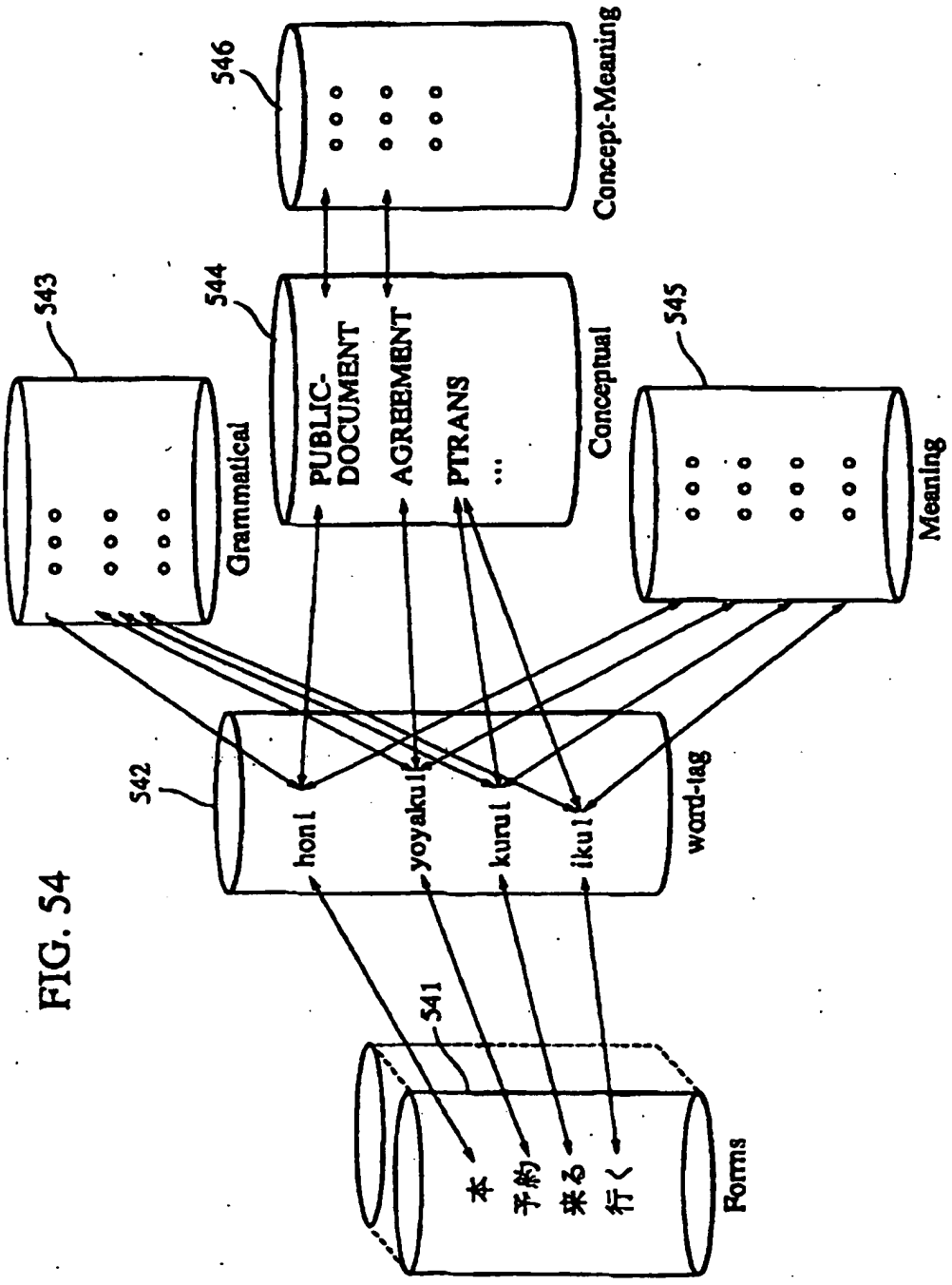

546
Concept-Meaning
544
PUBLIC-DOCUMENT
AGREEMENT
PTRANS
...
Conceptual
543
Grammatical
545
Meaning
542
hon1
yoyaku1
kuru1
iku1
word-tag
541
本
予約
来る
行く
Forms

FIG. 54

FIG. 55A

Word	Word-tag	Form (other properties)
come	come1	BASEFORM
comes	come1	PRESTFORM
coming	come1	PROGFORM
came	come1	PASTFORM
go	go1	BASEFORM
goes	go1	PRESTFORM
going	go1	PROGFORM
went	go1	PASTFORM
gone	go1	PARTFORM
book	book2	BASEFORM
books	book2	PRESTFORM
booking	book2	PROGFORM
booked	book2	PASTFORM
sent	send1	BASEFORM
send	send1	PASTFORM
get	get1	BASEFORM
got	get1	PASTFORM
get	get2	BASEFORM
got	get2	PASTFORM
get	get3	BASEFORM
got	get3	PASTFORM
reserve	reserve1	BASEFORM
reserved	reserve2	PASTFORM
work	work1	BASEFORM
accept	accept1	BASEFORM
agree	agree1	BASEFORM
decline	decline1	BASEFORM
discuss	discuss1	BASEFORM
inform	inform1	BASEFORM
travel	travel1	BASEFORM
travelling	travel1	PROGFORM-British
traveling	travel1	PROGFORM-US
analyse	analyse1	BASEFORM-British
analyze	analyse1	BASEFORM-US
meet	meet1	BASEFORM
visit	visit1	BASEFORM
visit	visit2	BASEFORM
...	...	...

FIG. 55

FIG. 55A

FIG. 55B

FIG. 55B

book	book1	SINGULAR
books	book1	PLURAL
pen	pen1	SINGULAR
pens	pen1	PLURAL
pencil	pencil1	SINGULAR
bencils	pencil1	PLURAL
letter	letter1	SINGULAR
letters	letter1	PLURAL
...	...	...
some	some1	
every	every1	
...	...	...
i	i1	SUBJECTIVE
me	i1	OBJECTIVE
my	i1	POSS_REL
mine	i1	POSS_OBJ_REL
you	you1	OBJECTIVE, SECOND
...	...	PERSON

FIG. 56

```
e.g.go      BASEFORM
  went      PASTFORM
  gone      PARTFORM
 *goes      PRESENTFORM
 *going     PROGFORM

[* - Forms  generated by rules
  Example rules are :
  a) if (BASEFORM ends in 'e' but not 'ee') then
        BASEFPRM - 'e' + 'ing' = PROGFORM
     else BASEFORM + 'ing' = PROGFORM
  b) if (BASEFORM ends in 'o' or 's' etc.)
    then BASEFORM + 'es' = PRESENTFORM
    else BASEFORM + 's' = PRESENTFORM
    (where to put this, what about nouns etc.····→ separate rule base ? )
]
```

FIG. 57

Wording	category		Position information	Rules	Nounform
come1	verb		wform, *lobj_direc, *From, *lobj_reason, *Instrument, *Time		
go1	verb		wform, *lobj_direc, *From, *lobj_reason, *Instrument, *Time		
send1	verb		wform, Object, *lobj_benf, *from, *lobj_via, *Instrument, *lobj_reason	focus (Object)	
			wform, lobj_benf, Object, *lobj_via, *from, *Instrument, *lobj_reason	focus (lob))	
get1	verb		wform, Object, *From, *Instrument, *Time		
get2	verb		wform, Object, *From, *Instrument, *Time		
get3	verb		wform, Object, *From, *Instrument, *Time		
book2	verb		wform, Object, *lobj_benf, *lobj_reason, *Time		
reserve1	verb		wform, Object, *lobj_benf, *lobj_reason, *Time		
accept1	verb		...		
agree1	verb		...		
decline1	verb		wform, *Object, *Instrument, *support, *lobj_reason, *Time		
inform1	verb		wform, lobj_benf, *Object, *Instrument, *Support, *Time		
discuss1	verb		wform, *Object, *Instrument, *Support, *Time		discussion
work1	verb		wform, *Object, *Support, *lobj_reason, *Time		
meet1	verb		wform, Object, *lobj_reason, *Support, *Time		
visit1	verb		wform, *Object, *Suppor, *Time1		
visit2	verb		wform, *Object, *Support, *Time		
accommodate1	verb		wform, *Object, *Time		accommodation
book1	noun	Countable, Neuter, Common_Noun	name, wform, *contains		
			name, wform, *contains, *authors	authors = NIL	
pen1	noun	Countable, Neuter, Common_Noun			
pencil1	noun	Countable, Neuter, Common_Noun			
workdomain1	noun	UnCountable, Neuter	wform, *Methodology, *Since		
letter1	noun	Countable, Neuter, Common_Noun			
i1	pronoun	First_Person, Singular, Common			
we1	pronoun	First_Person, Plural, Common			
you1	pronoun	Second_Perron, Singular, Common			
he1	pronoun	Third_Person, Singular, Masc			
she1	pronoun	Third_Person, Singular, Fem			
it1	pronoun	Third_Person, Singular, Neuter			
...					

FIG. 58

word-tag	Concept & Conditions
come1	PTRANS (Object-Nil, [obj_direc-Vicinity of Listener's location, Instrument-Vehicle) [or] PTRANS (Object-Nil, [obj_direc-Vicinity of Listener's location, Instrument-Vehicle)
go1	PTRANS (Object-Nil, [obj_direc-Place, From-Place, Instrument-Vehicle)
send1	PTRANS (Object-Movable, [obj_benf-Person, [obj_via-Person, Instrument ! = Actor, [obj_direc Event or Building, Instrument-Vehicle or Person or Action)
get1	PTRANS (Object-MovablePhysicalObject, [obj_benf-Actor, Instrument-Post, from ! = Actor)
get2	ATRANS (Object-MovablePhysicalObject, [obj_benf-Actor, Instrument-Post, from ! = Actor)
get3	MTRANS (Object-MtransNoun or MbuildNoun or MbuildNounform or Mfeel or Action, [obj_benf-Actor, Instrument-communication, from ! = Actor)
book2	AGREEMENT (Object-Ticket or Building or Accommodation, Instrument-Action or communication)
reserve1	AGREEMENT (Object-Ticket or Building or Accommodation, Instrument-Action or communication)
accept1	AGREEMENT (Object-Action or Offer, Mode+ve···)
agree1	AGREEMENT (Object-Action, rel-agreement)
decline1	AGREEMENT (Object-Action or Offer, Mode-ve···)
inform1	MTRANS (Object-MtransNoun or MbuildNoun or MbuildNounform or Mfeel or Action, [obj_benf-Person,Instrument-communication, from-Person)
discuss1	MTRANS (Object-MtransNoun or MbuildNoun or MbuildNounform or Mactobj or Action or SubMact, [obj_benf-Person, [obj_val-Nil, Instrument-communication, from-Nil, support-Building or Organization or Event)
work1	WORK (Object-Work_domain or Project,···)
attend1	MSENSE (Object-Event,···)
meet1	MEET (Object-Person, [obj_benf-Person,···)
visit1	MEET (Object-Person,···)
visit2	MSENSE (Object-Building,···)
accommodate1	PCONFIG (Obj-Person, Actor-Physical Object, Support-Living Building)
book1	PUBLIC-DOCUMENT (Published-Yes, Periodicity = nil···)
newspaper1	PUBLIC-DOCUMENT (Published-Yes, Periodicity = Daily,···)
pen1	WRITING-TOOL (Contains-Ink,···)
pencil1	WRITING-TOOL (Contains-Graphite,···)
letter1	PRIVATE-DOCUMENT (From-Person/Organization, Addressed to-Person/Organization, Written on-paper,···)
···	···

EP 0 720 090 A2

FIG. 59

book1 - written work or composition,···

book2 - reserve (a place, accommodation···)

reserve1 - order or set aside (seats, accommodation···)

come1 - movement towards where the listener is

go1 - movement away from where the speaker is

pencil1 - instrument for writing, drawing on paper

pen1- instrument for writing with ink on paper

···

EP 0 720 090 A2

FIG. 60

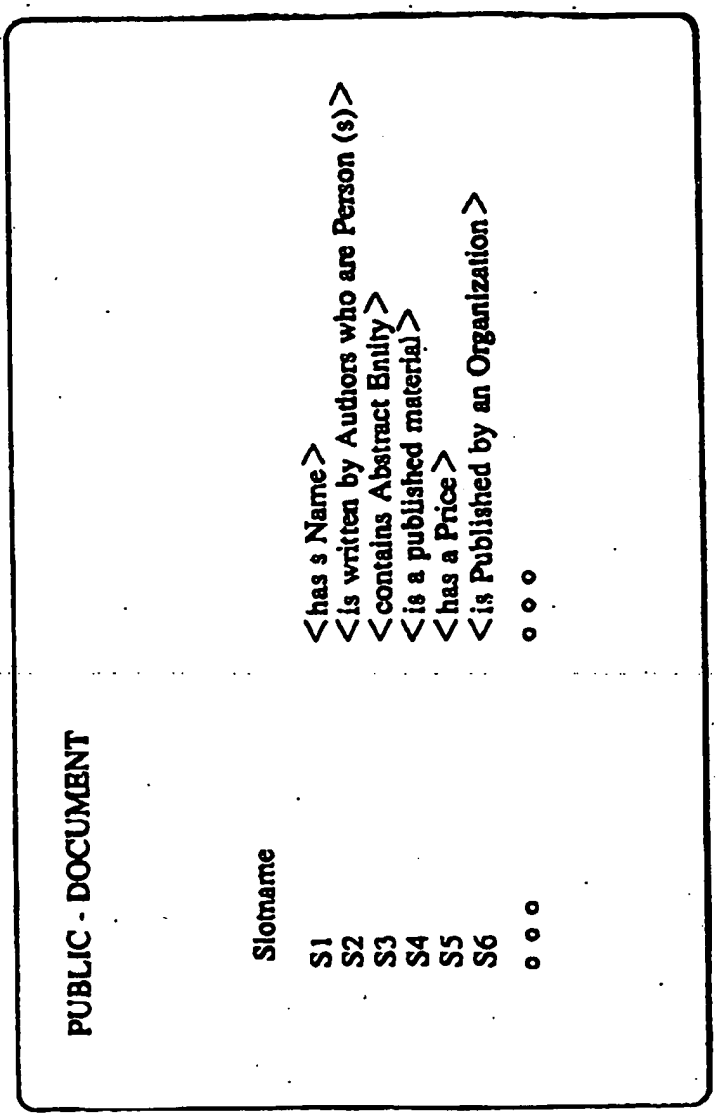

PUBLIC - DOCUMENT
Slotname
S1
S2
S3
S4
S5
S6
o o o
<has s Name>
<is written by Authors who are Person (s)>
<contains Abstract Entity>
<is a published material>
<has a Price>
<is Published by an Organization>
o o o

FIG. 61

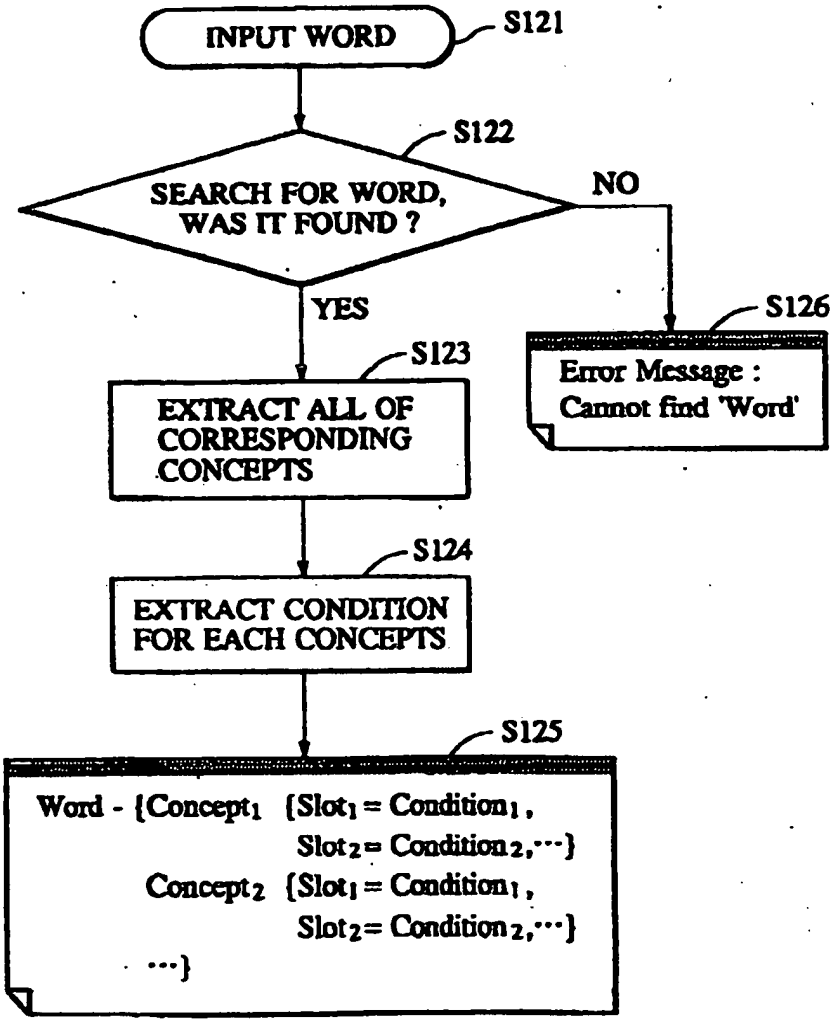

INPUT WORD
S121
S122
SEARCH FOR WORD, WAS IT FOUND ?
NO
YES
S126
Error Message : Cannot find 'Word'
S123
EXTRACT ALL OF CORRESPONDING CONCEPTS
S124
EXTRACT CONDITION FOR EACH CONCEPTS
S125
Word - {Concept1 {Slot1 = Condition1 , Slot2 = Condition2,···}
Concept2 {Slot1 = Condition1 , Slot2 = Condition2,···}
···}

FIG. 62

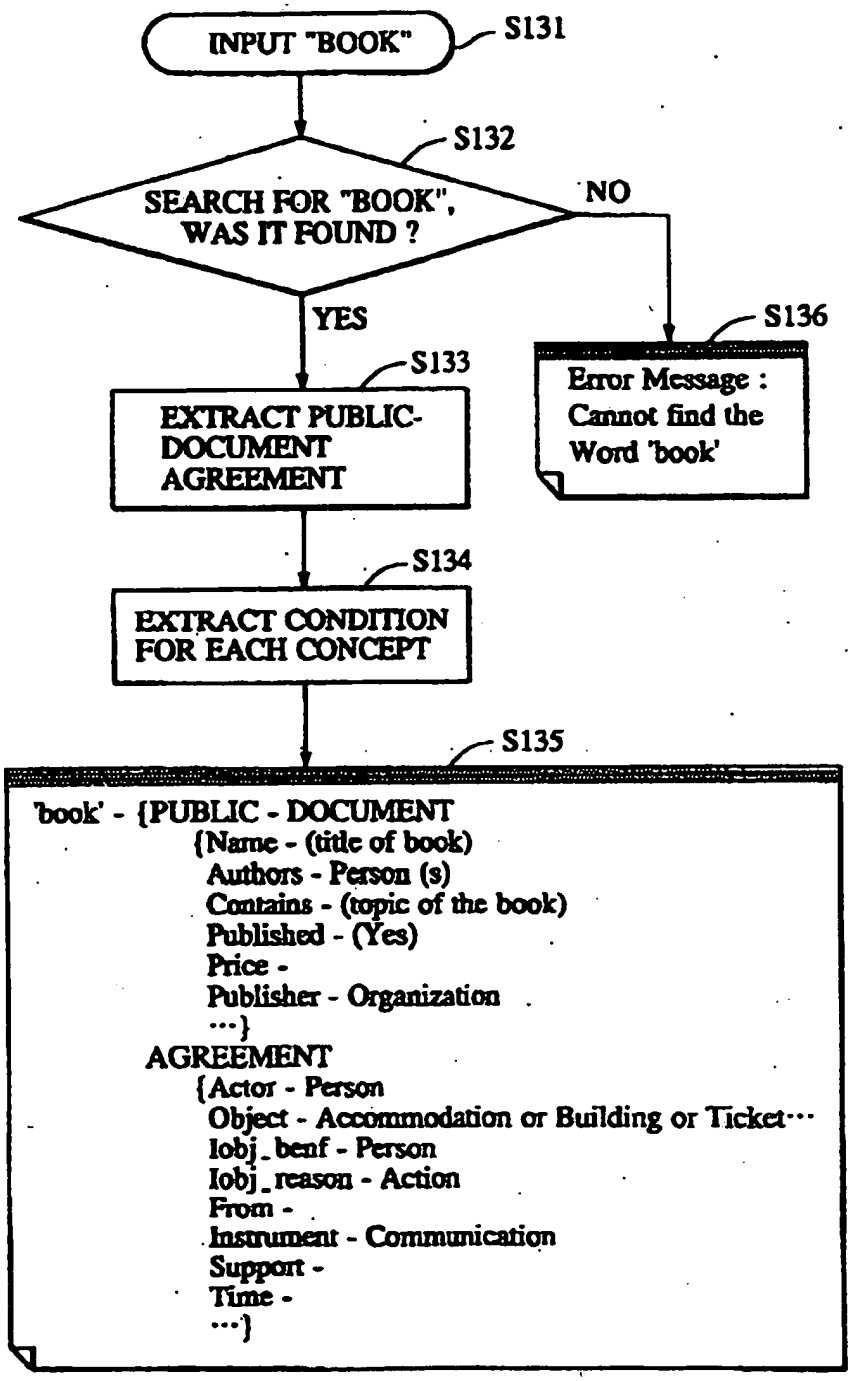

INPUT "BOOK"
S131
S132
SEARCH FOR "BOOK", WAS IT FOUND ?
NO
YES
S136
Error Message : Cannot find the Word 'book'
S133
EXTRACT PUBLIC-DOCUMENT AGREEMENT
S134
EXTRACT CONDITION FOR EACH CONCEPT
S135
'book' - {PUBLIC - DOCUMENT
{Name - (title of book)
Authors - Person (s)
Contains - (topic of the book)
Published - (Yes)
Price -
Publisher - Organization
···}
AGREEMENT
{Actor - Person
Object - Accommodation or Building or Ticket···
Iobj_benf - Person
Iobj_reason - Action
From -
Instrument - Communication
Support -
Time -
···}

FIG. 63

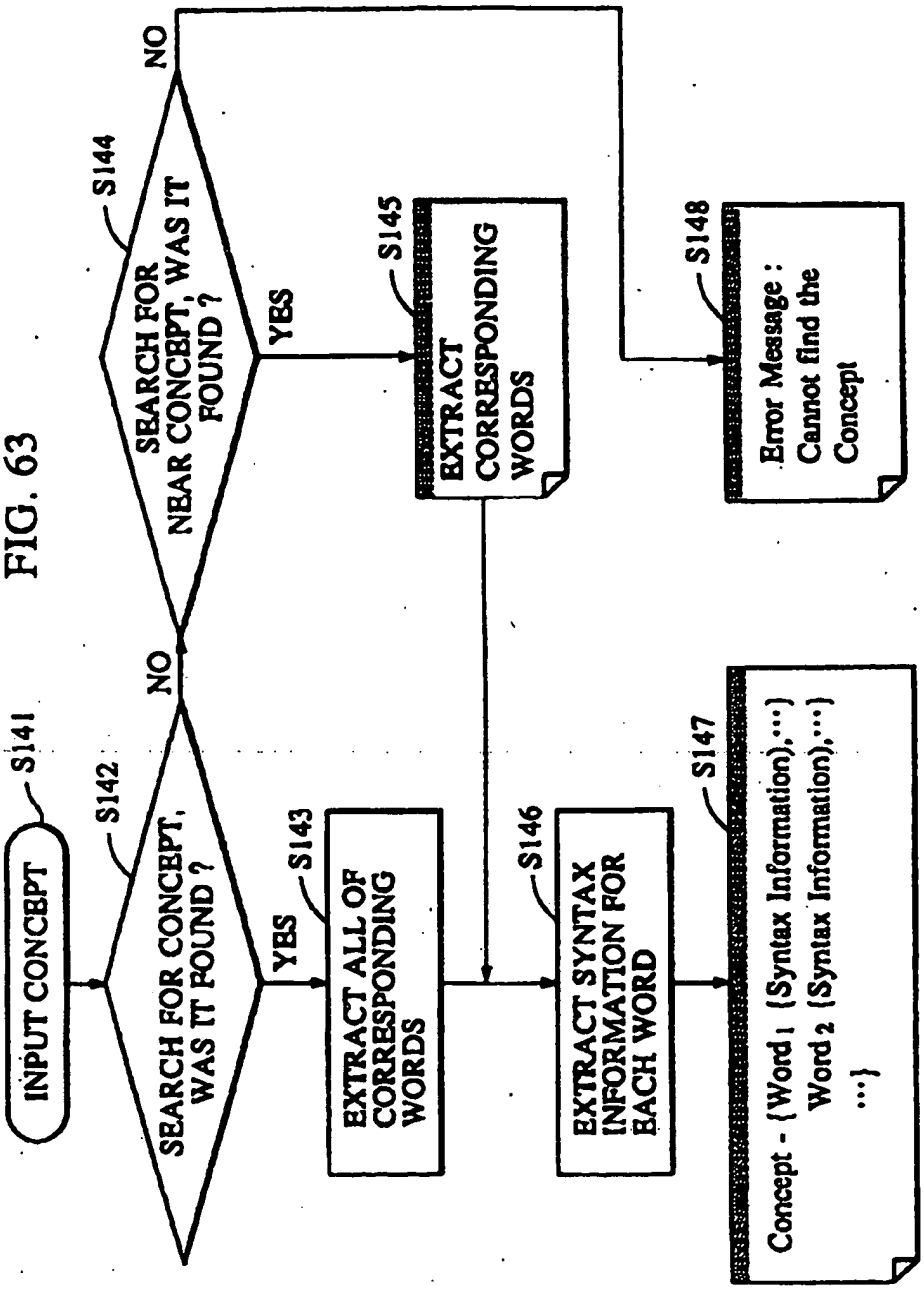

INPUT CONCEPT
S141
SEARCH FOR CONCEPT, WAS IT FOUND ?
S142
YES
NO
EXTRACT ALL OF CORRESPONDING WORDS
S143
SEARCH FOR NEAR CONCEPT, WAS IT FOUND ?
S144
YES
NO
EXTRACT CORRESPONDING WORDS
S145
EXTRACT SYNTAX INFORMATION FOR EACH WORD
S146
Concept - {Word1 (Syntax Information),···)
Word2 (Syntax Information),···)
···}
S147
Error Message : Cannot find the Concept
S148

FIG. 64

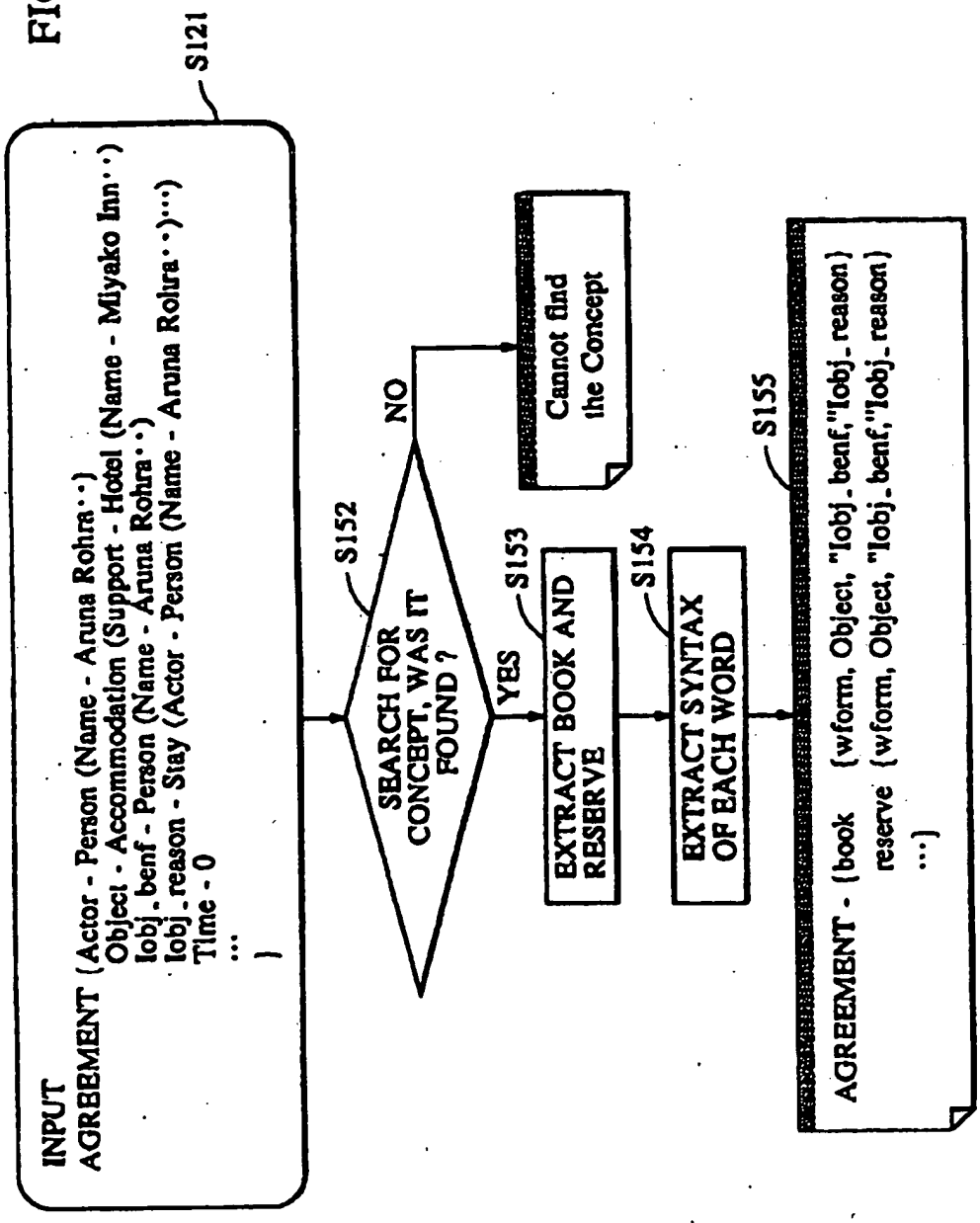

INPUT
AGRBEMENT (Actor - Person (Name - Aruna Rohra··)
Object - Accommodation (Support - Hotel (Name - Miyako Inn··)
Iobj_benf - Person (Name - Aruna Rohra··)
Iobj_reason - Stay (Actor - Person (Name - Aruna Rohra··)···)
Time - 0
···
)
S121
SEARCH FOR CONCEPT, WAS IT FOUND ?
S152
NO
YES
Cannot find the Concept
S153
EXTRACT BOOK AND RESERVE
S154
EXTRACT SYNTAX OF EACH WORD
S155
AGREEMENT - (book (wform, Object, "Iobj_benf,"Iobj_reason)
reserve (wform, Object, "Iobj_benf,"Iobj_reason)
···)

FIG. 65

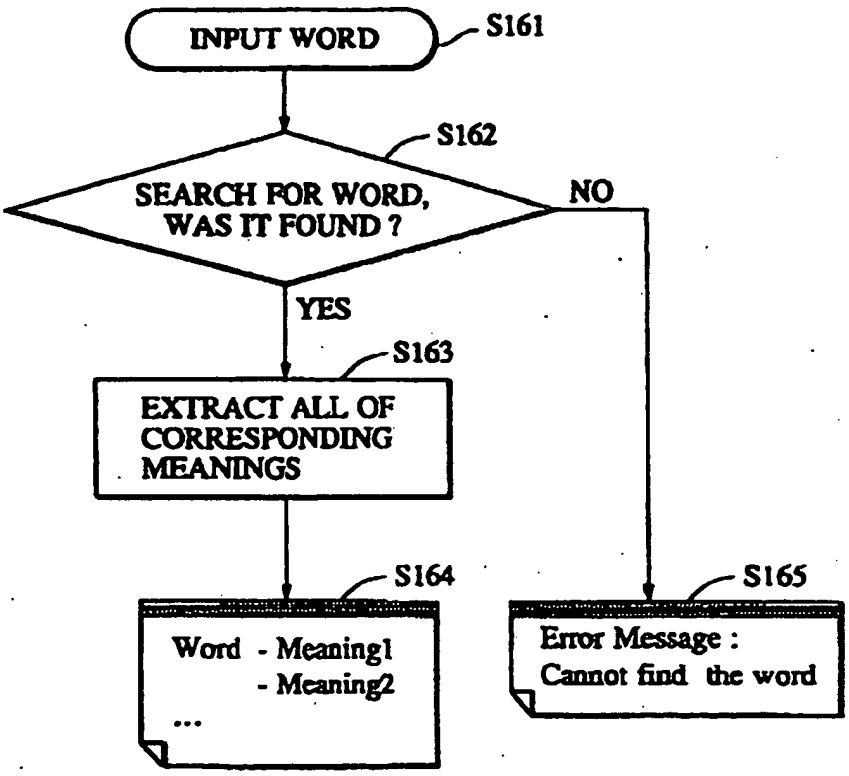

INPUT WORD
S161
S162
SEARCH FOR WORD, WAS IT FOUND ?
NO
YES
S163
EXTRACT ALL OF CORRESPONDING MEANINGS
S164
Word - Meaning1
- Meaning2
...
S165
Error Message :
Cannot find the word

FIG. 66

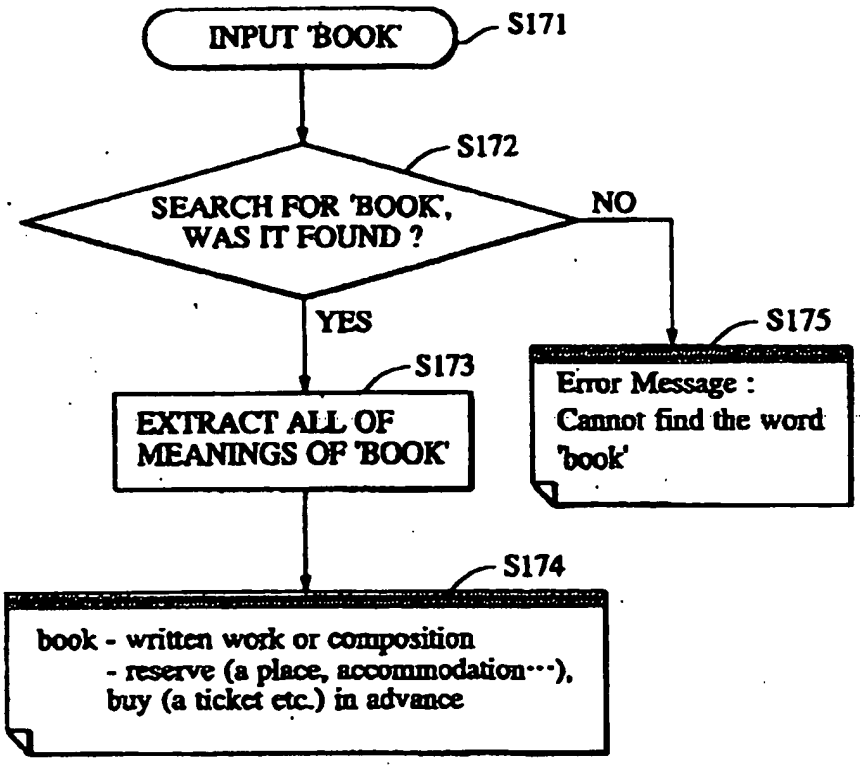

INPUT 'BOOK'
S171
S172
SEARCH FOR 'BOOK', WAS IT FOUND ?
NO
YES
S173
EXTRACT ALL OF MEANINGS OF 'BOOK'
S175
Error Message : Cannot find the word 'book'
S174
book - written work or composition
- reserve (a place, accommodation···), buy (a ticket etc.) in advance

FIG. 67

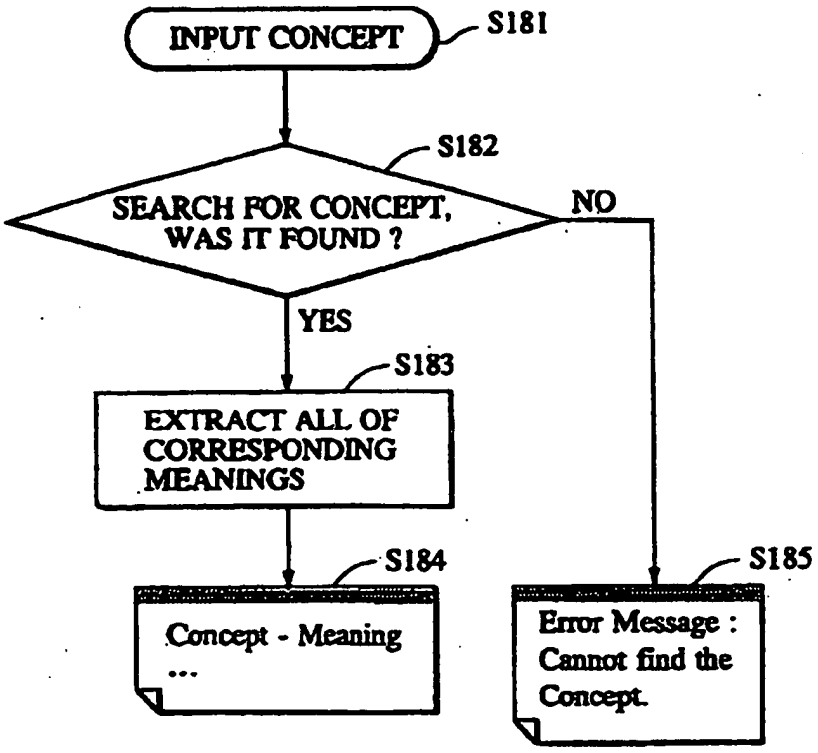

INPUT CONCEPT
S181
S182
SEARCH FOR CONCEPT, WAS IT FOUND ?
NO
YES
S183
EXTRACT ALL OF CORRESPONDING MEANINGS
S184
Concept - Meaning
...
S185
Error Message : Cannot find the Concept.

FIG. 68

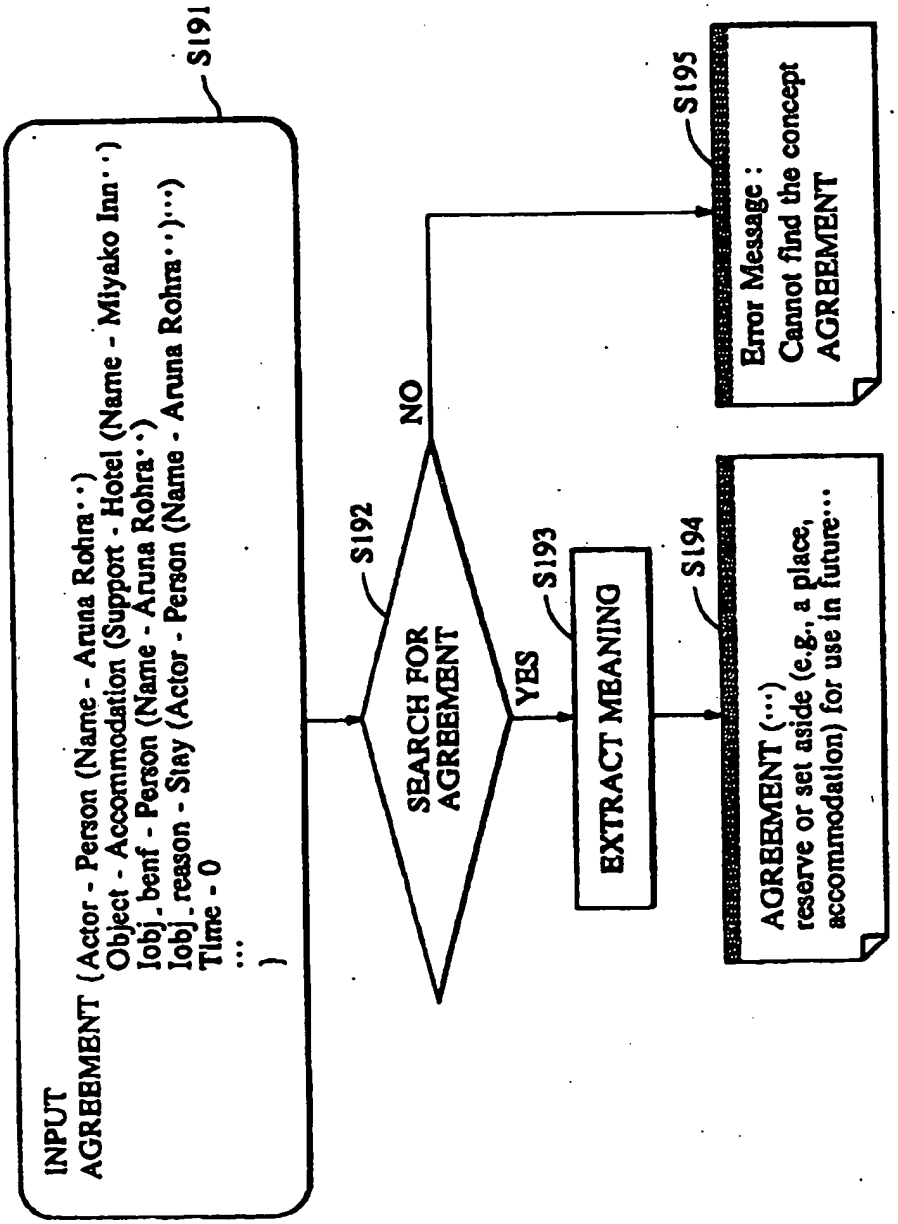

INPUT
AGREEMENT (Actor - Person (Name - Aruna Rohra' ')
Object - Accommodation (Support - Hotel (Name - Miyako Inn' ')
Iobj_benf - Person (Name - Aruna Rohra' ')
Iobj_reason - Stay (Actor - Person (Name - Aruna Rohra' ')...')
Time - 0
...
)
S191
SEARCH FOR AGREEMENT
S192
NO
YES
S193
EXTRACT MEANING
S194
AGREEMENT (...)
reserve or set aside (e.g., a place, accommodation) for use in future...
S195
Error Message :
Cannot find the concept
AGREEMENT

FIG. 69

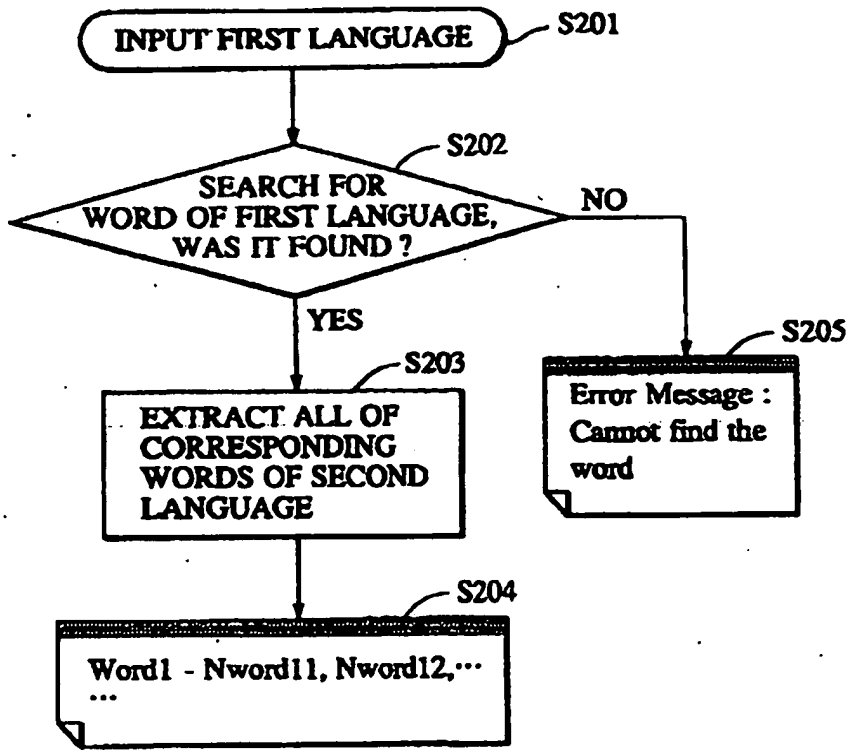

INPUT FIRST LANGUAGE
S201
S202
SEARCH FOR WORD OF FIRST LANGUAGE, WAS IT FOUND ?
NO
YES
S205
Error Message : Cannot find the word
S203
EXTRACT ALL OF CORRESPONDING WORDS OF SECOND LANGUAGE
S204
Word1 - Nword11, Nword12,···
···

FIG. 70

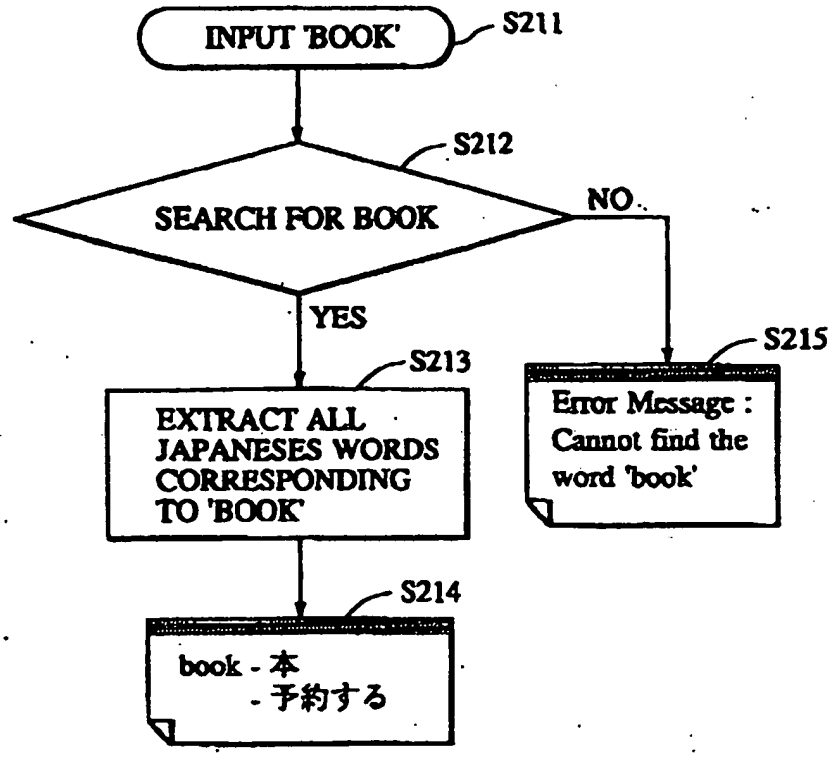

INPUT 'BOOK'
S211
S212
SEARCH FOR BOOK
NO
YES
S213
EXTRACT ALL JAPANESES WORDS CORRESPONDING TO 'BOOK'
S215
Error Message : Cannot find the word 'book'
S214
book - 本
- 予約する

FIG. 71

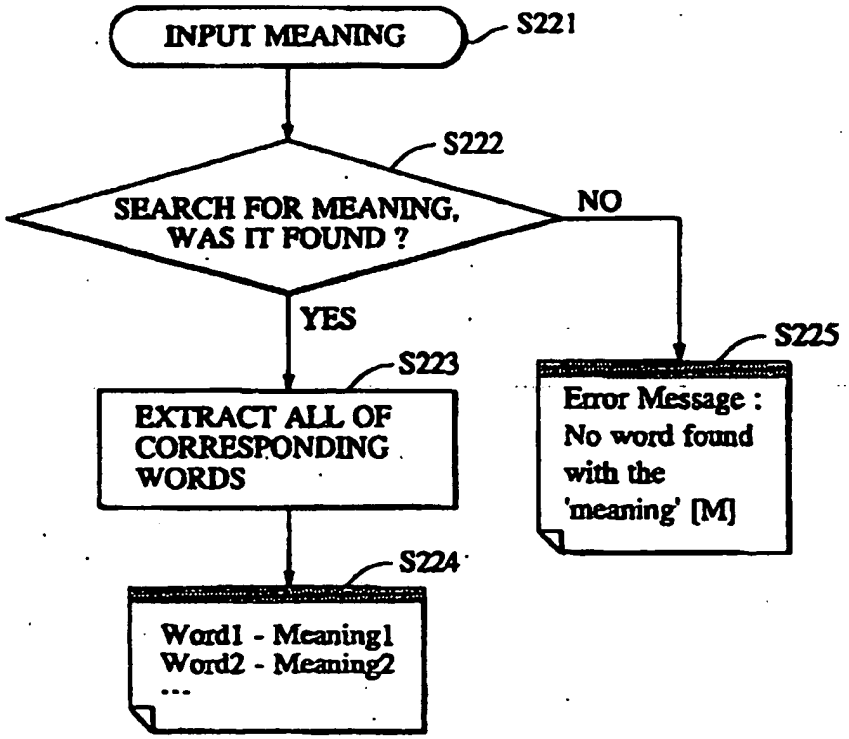

INPUT MEANING
S221
S222
SEARCH FOR MEANING, WAS IT FOUND ?
NO
YES
S223
EXTRACT ALL OF CORRESPONDING WORDS
S224
Word1 - Meaning1
Word2 - Meaning2
...
S225
Error Message : No word found with the 'meaning' [M]

FIG. 72

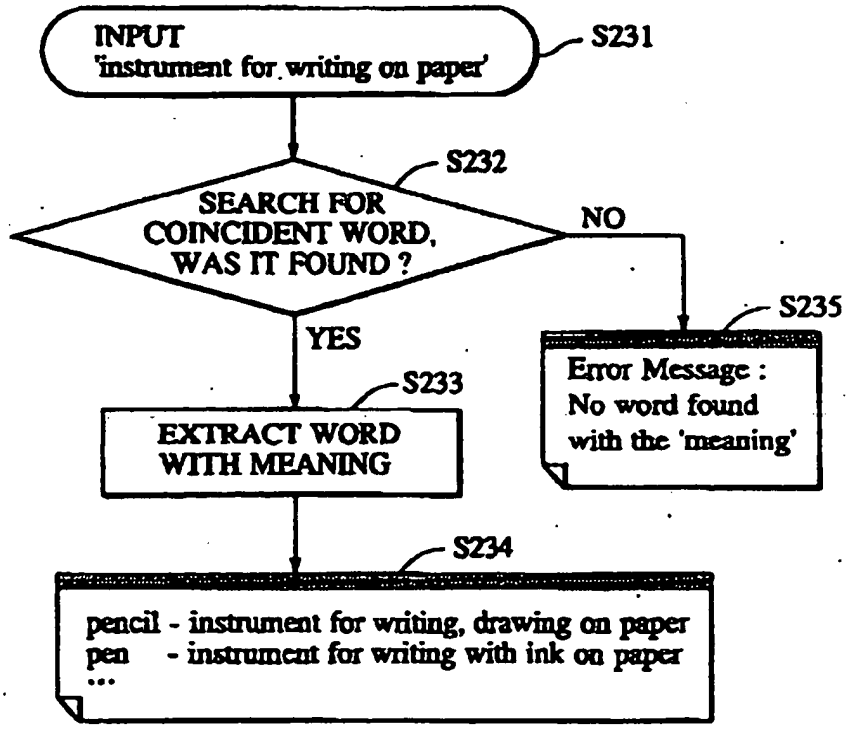

INPUT
'instrument for writing on paper'
S231
S232
SEARCH FOR COINCIDENT WORD, WAS IT FOUND ?
NO
YES
S235
Error Message :
No word found
with the 'meaning'
S233
EXTRACT WORD WITH MEANING
S234
pencil - instrument for writing, drawing on paper
pen - instrument for writing with ink on paper
...

FIG. 73

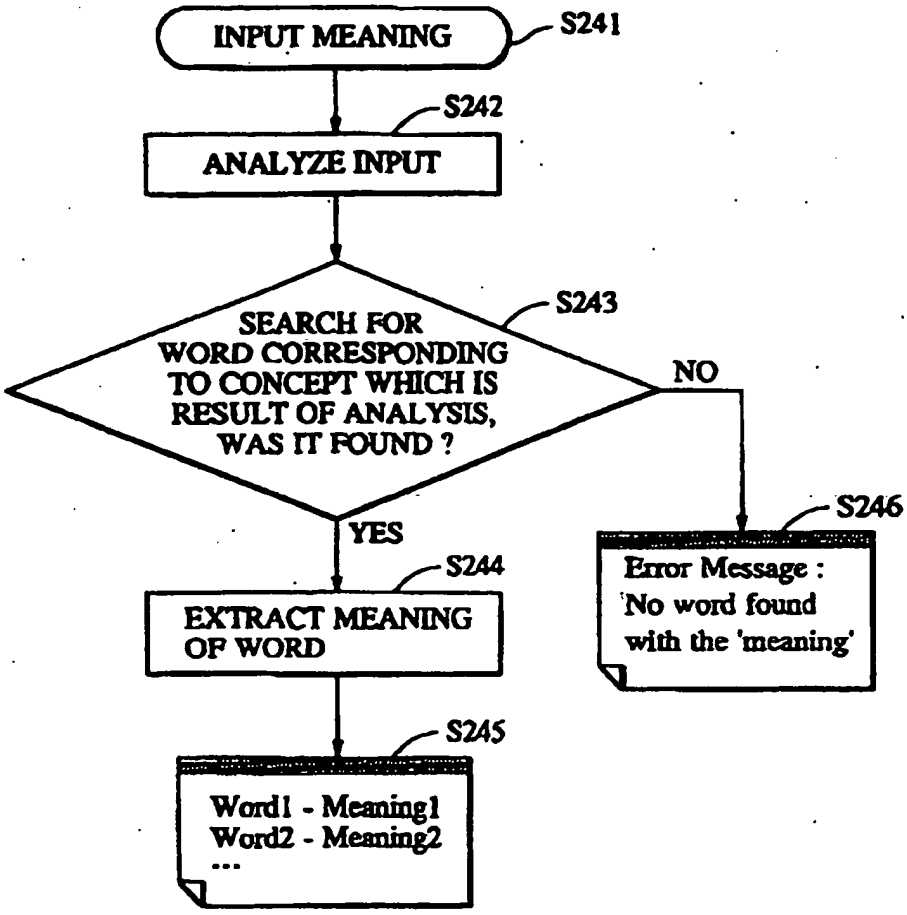

INPUT MEANING
S241
S242
ANALYZE INPUT
SEARCH FOR WORD CORRESPONDING TO CONCEPT WHICH IS RESULT OF ANALYSIS, WAS IT FOUND ?
S243
NO
YES
S244
EXTRACT MEANING OF WORD
S245
Word1 - Meaning1
Word2 - Meaning2
...
S246
Error Message :
'No word found
with the 'meaning'

FIG. 74

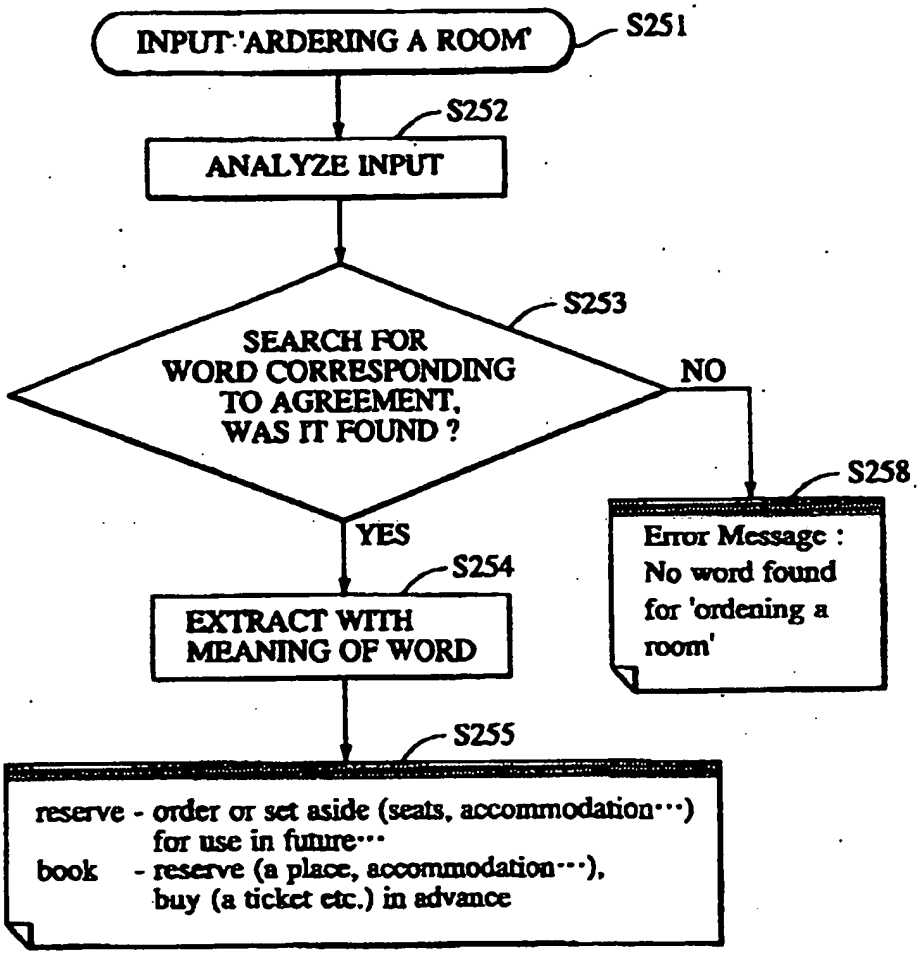

INPUT 'ARDERING A ROOM'
S251
S252
ANALYZE INPUT
S253
SEARCH FOR WORD CORRESPONDING TO AGREEMENT, WAS IT FOUND ?
NO
S258
Error Message : No word found for 'ordening a room'
YES
S254
EXTRACT WITH MEANING OF WORD
S255
reserve - order or set aside (seats, accommodation···) for use in future···
book - reserve (a place, accommodation···), buy (a ticket etc.) in advance

FIG. 75

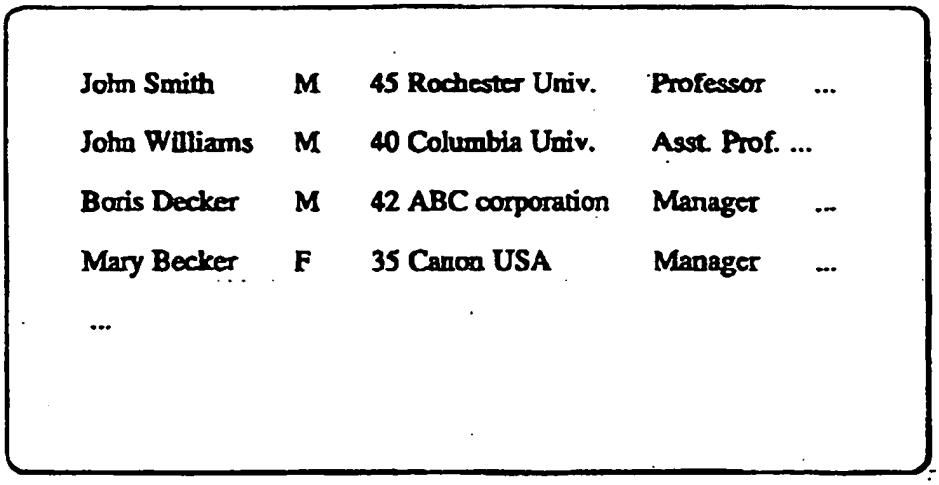

John Smith M 45 Rochester Univ. Professor ...
John Williams M 40 Columbia Univ. Asst. Prof. ...
Boris Decker M 42 ABC corporation Manager ...
Mary Becker F 35 Canon USA Manager ...
...

FIG. 76

C1 MTRANS

SLOTNAME	KNOWLEDGE STRUCTURE
Actor	PERSON
Object	LETTER (...)
Instrument	
Iobject - Beneficiary	C2
- Reason	ACTION
- Direction	
- Via	
From	
Support	
Time	TIME
Connected To	
Tense	
Qualifier	

C2 PERSON

PERSON :	
S1	(neme - Boris)
S2	
S3	
S4	TIME
S5	VENUE
S6	
S7	ORGANZATION (ABC Corporation)
S8	
S9	
...	

FIG. 77

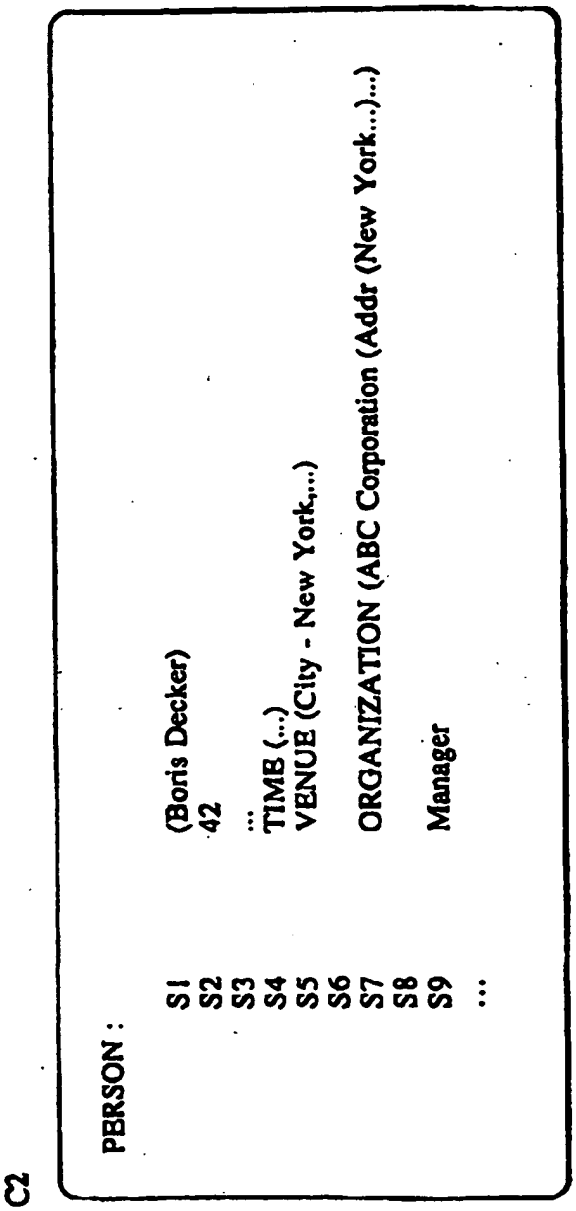

C2
PERSON :
S1 (Boris Decker)
S2 42
S3 ...
S4 TIME (...)
S5 VENUE (City - New York,...)
S6
S7 ORGANIZATION (ABC Corporation (Addr (New York...)...)
S8
S9 Manager
...

FIG. 78

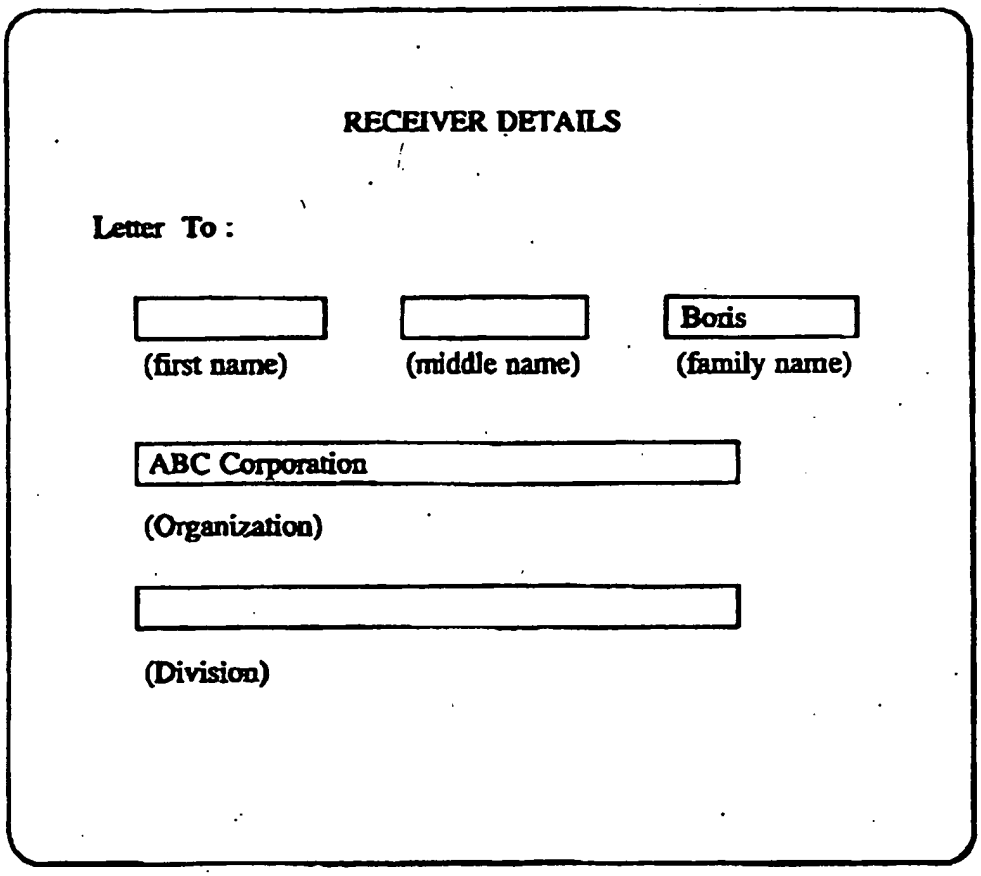

RECEIVER DETAILS
Letter To :
(first name)
(middle name)
Boris
(family name)
ABC Corporation
(Organization)
(Division)

FIG. 79

C3 MEET

SLOTNAME	KNOWLEDGE STRUCTURE
Actor	PERSON
Object	C2
Instrument	
Iobject - Beneficiary	PERSON
- Reason	ACTION
- Direction	
- Via	
From	
Support	C5
Time	TIME
Connected To	
Tense	
Qualifier	

C4

PERSON :

S1	(name - John Smith)
S2	
S3	
S4	TIME
S5	VENUE
S6	
S7	C5
S8	
S9	
...	

C5

ORGANIZATION :

S1	(Duke University)
S2	ORGANIZATION
S3	ORGANIZATION
...	

FIG. 80

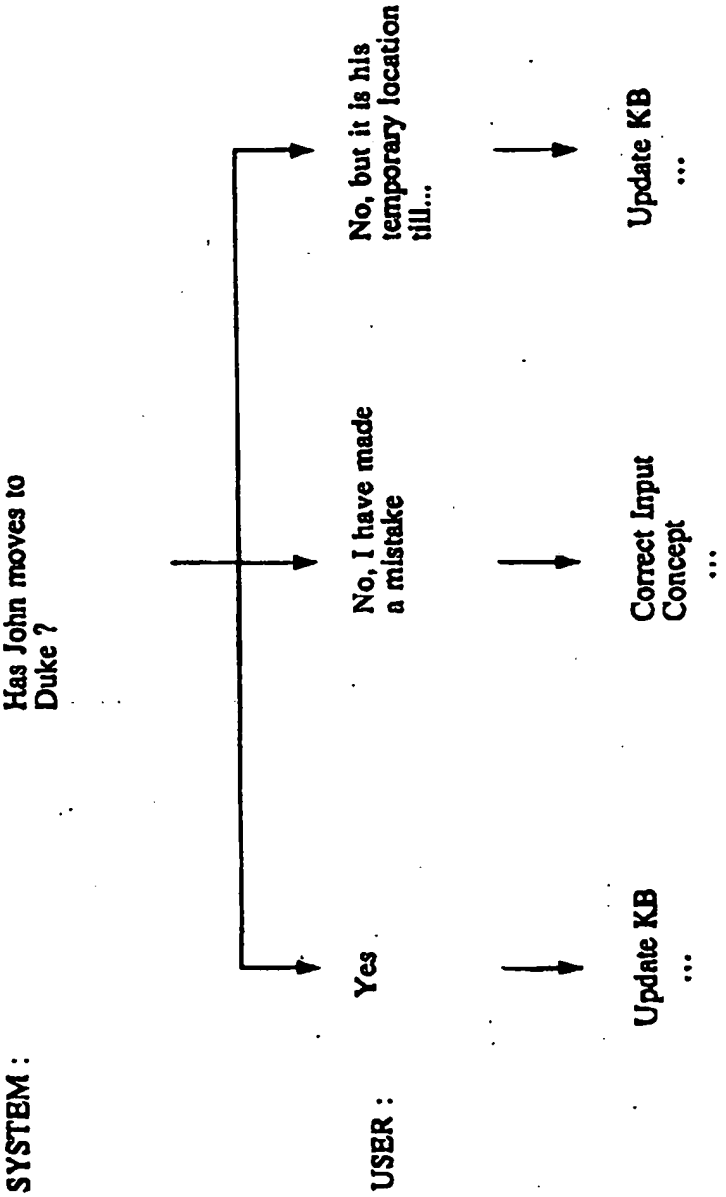

SYSTEM :
Has John moves to Duke ?
USER :
Yes
Update KB
...
No, I have made a mistake
Correct Input Concept
...
No, but it is his temporary location till...
Update KB
...

FIG. 81

C6 MEET

SLOTNAME	KNOWLEDGE STRUCTURE
Actor	PERSON
Object	PERSON
Instrument	
Iobject - Beneficiary	PERSON
- Reason	ACTION
- Direction	
- Via	
From	
Support	PLACE / ORGANIZATION
Time	C7
Connected To	
Tense	
Qualifier	

C7

TIME :

S1	<has Second>	
S2	<has Minute>	
S3	<has Hour>	
S4	<has Day>	10
S5	<has Day part>	
S6	<has Week>	
S7	<has Week part>	
S8	<has Month>	
S9	<has Month part>	
S10	<has Year>	
...		

FIG. 82

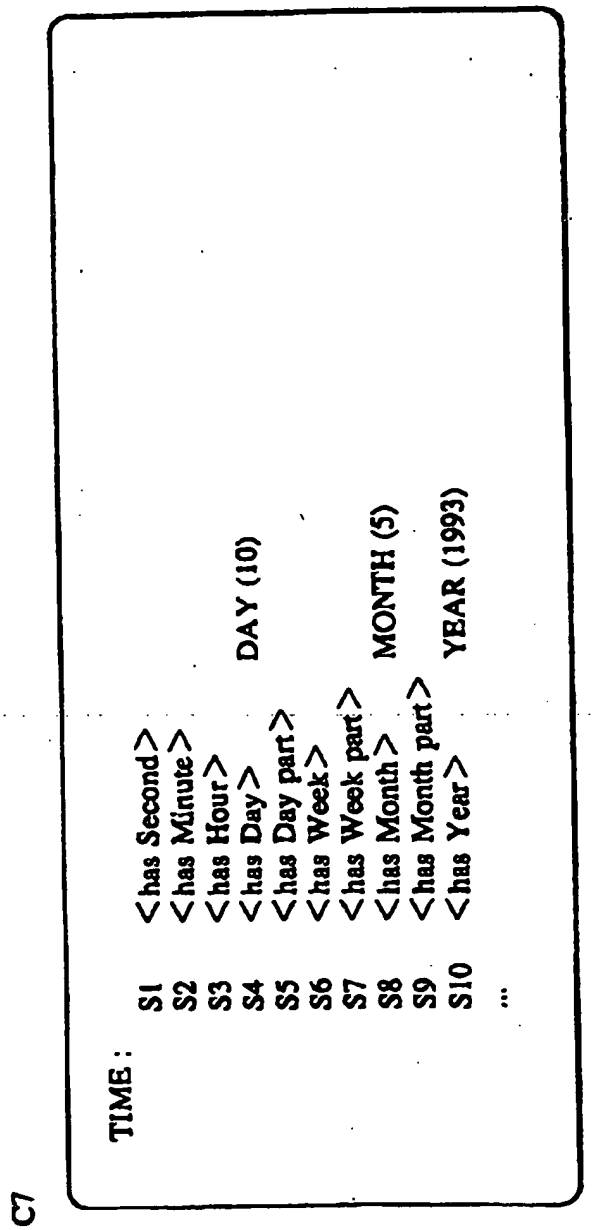

C7
TIME :
S1 <has Second>
S2 <has Minute>
S3 <has Hour>
S4 <has Day>
S5 <has Day part>
S6 <has Week>
S7 <has Week part>
S8 <has Month>
S9 <has Month part>
S10 <has Year>
...
DAY (10)
MONTH (5)
YEAR (1993)

FIG. 83

C8 MEET

SLOTNAME	KNOWLEDGE STRUCTURE
Actor	PERSON
Object	C9
Instrument	
Iobject - Beneficiary	PERSON
- Reason	ACTION
- Direction	
- Via	
From	
Support	(C10 of PERSON (Boris))
Time	TIME
Connected To	
Tense	
Qualifier	

C9

PERSON :

S1	(name - John Smith)
S2	
S3	
S4	TIME
S5	VENUE
S6	
S7	
S8	
S9	
...	

C10

ORGANIZATION :

S1	( )
S2	ORGANIZATION
S3	ORGANIZATION
...	

FIG. 84

C8 MEET

SLOTNAME	KNOWLEDGE STRUCTURE
Actor	PERSON
Object	C9
Instrument	
Iobject - Beneficiary	PERSON
- Reason	ACTION
- Direction	
- Via	
From	
Support	(C10 of PERSON (Boris))
Time	TIME
Connected To	
Tense	
Qualifier	

C10

ORGANIZATION :

S1	(ABC Corporation)
S2	ORGANIZATION
S3	ORGANIZATION
...	

FIG. 85

C11 MTRANS

SLOTNAME	KNOWLEDGE STRUCTURE
Actor	PERSON
Object	C12
Instrument	
Iobject - Beneficiary	PERSON
- Reason	ACTION
- Direction	
- Via	
From	
Support	
Time	C13
Connected To	
Tense	
Qualifier	

C12

KNOWLEDGE DOMAIN :

S1	NLP
S2	
S3	Artificial Intelligence
...	

C13

TIME

S1	
...	
S12	(>Conference (Name - AAAI on - C12))
...	